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Telephony.

THE AMERICAN TELEPHONE JOURNAL

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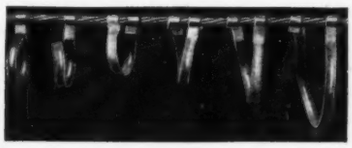

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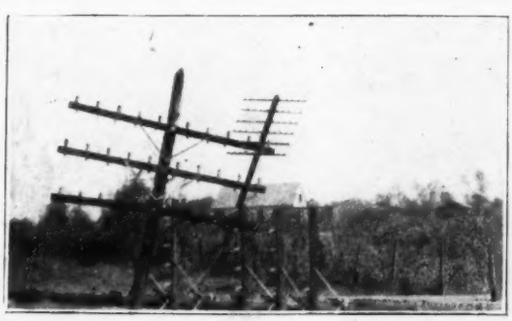

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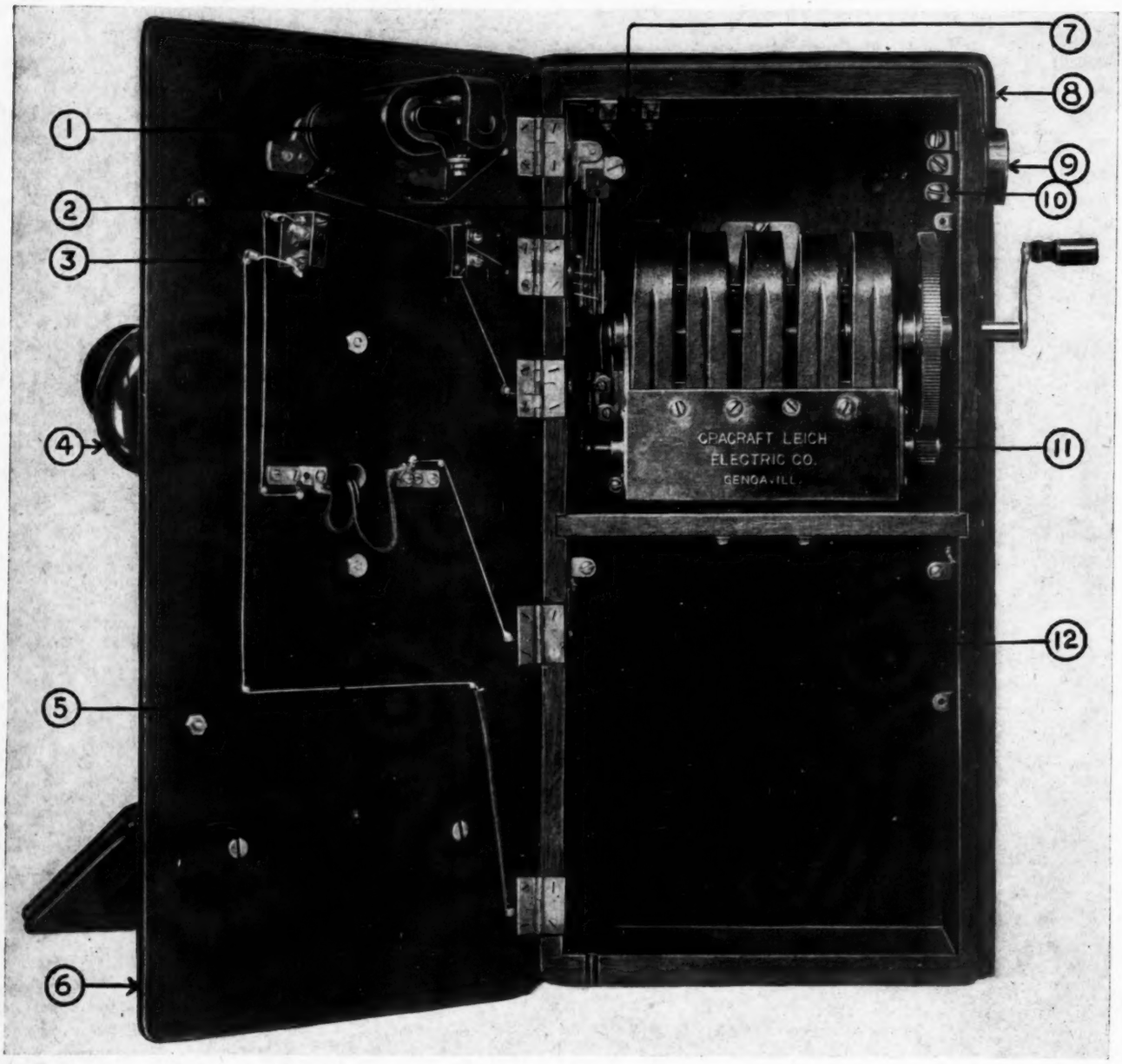

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Telephony.

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EDUCATION.

Education is something you must get by hard work. It is something you cannot buy. You can give it away to no man, and no man can take it from you. It extends the boundaries of your mental vision, and it gives you the key with which to unlock the treasure-house of all time. To gain it, men have starved their bodies and through it they have beautified their souls. It is among the best of the gifts of the Creator, since it is a prize that anyone can win.—George A. Hoadley.

Why the Public Utility Is a Good Citizen.

In every community reside persons who are known as good citizens or are said to be desirable citizens. Industries are also classified as desirable or undesirable citizens. Sometimes great efforts are made to have a certain industry locate its plant in a community, for it is believed that it will make a desirable citizen. These efforts are made because the community expects to benefit materially from the presence of the new factory or business. In the first place there will be the employment of people, thus adding to the population of the community. Further, the plant or factory pays taxes and is generally looked upon as a desirable addition to a city, as it bears its proportionate cost—and sometimes more—of the community's operating expenses.

The corporation is an artificial person created by law. Generally the private corporation is classed as a desirable citizen, although sometimes this is not the case. The public utility, unfortunately, is not looked upon in many communities as a desirable citizen and is frequently treated as a most undesirable one, in fact. It is sometimes considered in the light of a necessary evil. The reason for this unjust classification is, to a large extent, due to a non-realization of the real good citizenship of the utility.

A good citizen is always interested in everything that concerns the community welfare. He pays his taxes promptly after having accurately and honestly reported on his income and property. His money, it will be found, is invested in home enterprises, thus aiding in the employment of the people of the place. The organizations with which he is identified are noted for their fair dealings and he, personally, has the respect and esteem of all his fellow citizens.

If the telephone companies were to be measured and judged by the standards of citizenship as found in the communities they serve, would not the public change its opinion regarding them? The unthinking men do not realize that the telephone company is a fellow citizen. They do not think of the fact that the company has paid in taxes a sum undoubtedly greater than their individual taxes. Nor do they know about the business which the wires of the company have brought into the community from the neighboring country and adjacent places.

The company has invested its money in a home enterprise. It provides employment under good, healthy conditions for many persons, both men and women. It might be pointed out that as an employer the telephone corporation is a most desirable citizen. Unlike some industries its employes are quite evenly divided between men and women. While it might at first appear that more women are employed than men, the census reports show that the women do not outnumber the men as much as thought.

In some places in the East, the industries of a community employ women almost exclusively and men find it difficult to obtain work. Such conditions prevail in cities where shirts and collars are manufactured, as in Troy, N. Y., and where there are no corresponding industries to employ men. The telephone company, however, is not a one-sided employer.

There are many other characteristics ascribed to good citizenship, which are possessed by the artificial person—the telephone company—if the public were only made to realize them. One of the means of bettering the relations of a company with the public is to explain the company's good citizenship qualifications that the unthinking man may be set right in his ideas which are based upon unsound arguments.

The Djins and Giants of the Imagination

By HERBERT KAUFMAN

Goodness knows how long apples kept falling on thick-heads before Newton was hit by his illuminating pippin. The other fellows weren't sufficiently interested in the episode to investigate the cause. They accepted it as a matter of course. He simply wondered why it happened, and kept on pondering until he worked out the law of gravitation.

All new theories are based upon old facts. The raw materials for railroads and telephones were on hand when Nebuchadnezzar was grazing. Hamilcar might have fought with machine guns and motor transports if one or two of his ancestors hadn't been so pleased with the quality of their spears and arbalests.

Whenever and wherever man has been sufficiently dissatisfied with existing efficiencies, amazing results have followed. Intelligence isn't a modern discovery. All the achievements of today were possible long ago. Our greatest weakness is the habit of pausing for a century to gloat over the prowess of a decade.

We have never done our utmost in any period. The ancients learned to temper bronze and build pyramids. Then they quit thinking for awhile. Archimedes and Euclid evolved mathematical problems that still strain the sophomoric capacity, after which their contemporaries ceased to bother with the subject.

Judging by the scant records which have come down to us from the dawns, it is manifest that the resources of our present estate were attainable to human reasoning thousands of years ago. Progress is constantly blocked by the indifference and complacency of the multitude.

If one per cent. of the people would ever think for themselves, their combined efforts would bankrupt prediction.

Nature hasn't added many essential elements to the earth since its crust cooled. There have been a few transformations but, in the main, all the substances we handle now, were available in the Pleistocene age.

What we have done is not extraordinary, but it is to the eternal discredit of the race that we took so long to accomplish the bulk of our chores. At that, a few individuals are responsible for all the departures from precedent.

Humanity en masse is a distinct failure. The majority is and has ever been negligent, lazy, and unambitious. Open the average head, and there isn't an idea in it that somebody else's mind didn't plant there.

Millions of us never had an original thought, despite the possession of the same faculties which enable our fellows to plan flying machines, prevent epidemics, embalm voices, photograph motion, drain seas and weigh skies.

The djins and giants of imagination are in your brain, too, but you won't let them out of the cells and set them to work. Discoverers aren't complex beings—they're precisely like you, plus an inquiring habit. They see little things and magnify them into vast undertakings. They notice trifles and develop them into enterprises.

Practically all the betterments of life resulted from quiet hints which Nature dropped before observing eyes. But egotists can't see them. They're too busy contenting themselves to speculate upon their surroundings.

Most of us are overlooking the signals of opportunity—the unrealized possibilities in plain sight everywhere. Any knowledge we possess is primary. We haven't found the best way to do a single thing. Get An Idea!

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"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

458. State the principal difference between the circuit arrangement shown in Fig. 159 and that shown in Fig. 160.

459. Why are two induction coils used in the anti-side-tone operator's set shown in Fig. 161?

460. What is the function of the resistance 4—5, in Fig. 161?

CHAPTER XX. The Operator's Equipment (Concl'd).

461. *Operator's transmitter on small switchboards.*—The transmitter used by the operator is subject to the same laws as the one used by the subscriber. It is, however, most important that the outgoing transmission from the operator's telephone set be as good as possible. For that reason various schemes have been employed by telephone switchboard manufacturers to place the transmitter in the most advantageous position. With single position switchboards serving a comparatively light traffic from a small number of lines, it is sufficient to mount the operator's transmitter upon a curved supporting crane, adjustable vertically as well as to and from the operator, and swinging in a socket placed upon the top of the switchboard cabinet. In larger switchboards, the transmitter is suspended and balanced from the two conducting cords attached to its terminals.

462. *Operator's transmitter on large switchboards.*—In modern switchboards of large size and calling for the handling of a steady stream of heavy traffic, the breast-plate transmitter is almost universally used. While the design of the breast-plate transmitter is rather difficult without incurring a loss in transmitting efficiency, its great advantages more than offset any inherent defect in design. In other words, the average improvement in transmission obtained because the transmitter mouthpiece is always directly before the operator's lips as she moves from side to side of her position, is much greater than the slight loss incurred by mounting the transmitter upon a light framework without rigid support.

The additional difficulty of maintaining the cord attached to the breast-plate transmitter in good condition is not to be considered in view of the improved transmission obtained by its use. Sanitary considerations, also, which permit each operator to retain her own telephone transmitter and receiver, are most important in adding to the value of the device in modern telephone operating.

CHAPTER XXI. Telephone Circuit Efficiency.

463. *Difficulty of formulating standard for telephone circuit performance.*—The efficiency of ordinary electric circuits, aside from those devoted exclusively to telephone transmission, is easily determined. Since the object of all such electrical circuits is to transmit power from one point to another, it is sufficient, ordinarily, to measure the power expended at one end of the circuit and the power realized at the other in order to arrive at a basis for the determination of its efficiency as a transmitting medium. There is, of course, in any electrical circuit a certain loss and the object of the engineer is to so design the circuit that the loss, the investment, and the return shall bear the proper relation to each other.

While the telephone circuit is also a means of transmitting power from one point to another, its efficiency as a *telephone circuit* is not dependent entirely upon the ratio between the amount of *power* delivered to it and the amount taken from it at the distant terminal. Its function is not only to transmit the actual power with as little loss as possible, but it must also preserve, to the greatest possible degree, the exact characteristic of the alternating voice-carrying current required to reproduce the tones and quality of the speaker's voice by means of the distant receiver diaphragm.

The effect of the line resistance, capacity, reactance and leakage upon the very complicated telephonic voice-carrying currents is not a simple one. In the first place the voice-carrying currents have a constantly changing frequency; their voltage is constantly being varied by the transmitter conditions and the actual amount of power sent into the line is subject to constant change. The matter of determining the transmitting efficiency of the telephone circuit becomes, therefore, much more than a simple measurement of power delivered to it and received from it.

It is obvious that the musical note, *E*, when produced by a violin string should not have the same sound as the same note does when it is produced by a piano string. The rate of vibration of the string as a whole is the same in both cases, but when the tone is produced by the violin string the principal vibration of the string is qualified by other vibrations of short lengths of the string at a much higher rate.

In the case of the piano string, the same thing is true but the *overtones* of the piano string have a different characteristic from those produced by the violin string. Overtone vibrations produce, in each case, corresponding vibrations in the transmitter diaphragm, and these subsidiary vibrations produce their corresponding variations in the voice-carrying telephonic currents.

It is obvious that, in order to reproduce exactly the tone of the violin as well as that of the piano, each one of these small variations of the voice-carrying currents must be preserved in the current as it passes over the line to the distant receiver. It is the more or less faithful reproduction of

these overtones of the human voice that enables us to recognize at once the voice of a friend reaching us over the telephone. Should the overtones be destroyed or *changed,* the voice of our friend would lose its distinctive quality or timbre and we should be unable to identify it.

It is for this reason that the telephone circuit must be rated, as to efficiency, upon the faithfulness with which it transmits in every detail to the distant *receiver* diaphragm, the vibrations of the receiving *transmitter* diaphragm.

464. *Method of determining the efficiency of a telephone circuit.*—For the reason just given, the only practicable way of determining the efficiency of the telephone circuit is to compare its actual performance with that of another circuit used as a standard. If two standard common battery telephone instruments are connected with each other by two standard repeating coils connected as battery supply coils and joined together by a standard telephone cable pair of No. 19 gauge wires, the arrangement will constitute the most commonly accepted means of making comparisons between different telephone circuits as to their transmitting efficiency.

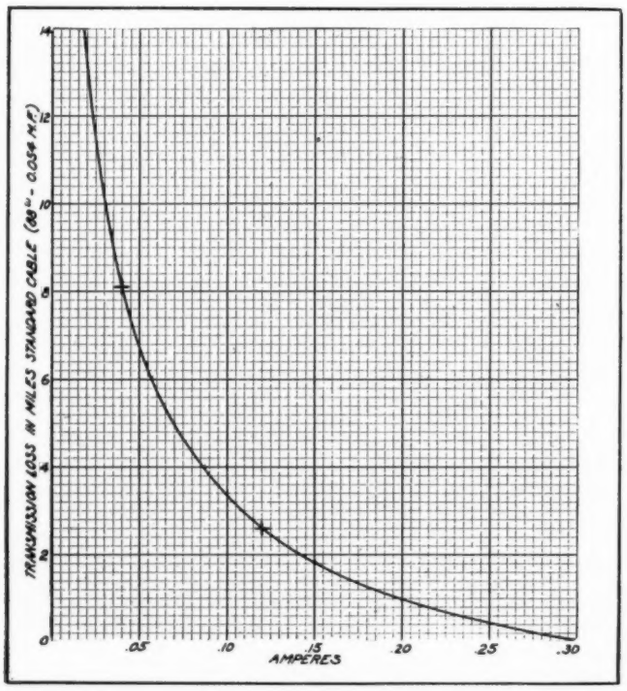


Fig. 163. Transmission Loss in a Common Battery Transmitter Due Solely to Decrease in Current Through It.

When any given circuit is to be rated for transmission, it is connected so that the standard arrangement can be substituted for it instantly. Skilled observers then compare the transmission over the standard with that over the circuit being rated and *insert standard cable into* the standard circuit, arranged as just described, until the transmission over the standard circuit has been brought down to the same value as that over the circuit being rated. This is done by means of an artificial cable with switches by means of which the equivalent of lengths of cable can be inserted into the circuit in increments as small as 0.5 mile.

When the transmission over the standard circuit has been brought down to equal that over the circuit being rated, by the insertion of standard cable, the number of miles that it has been found necessary to insert is said to be the transmission loss in the circuit under test, or, more briefly its transmission equivalent. The standard cable used for this purpose always has a resistance of 88 ohms per mile and a mutual capacity for each pair between conductors of 0.54 mf. per mile.

465. *Accuracy of results obtained.*—By this somewhat roundabout method, the total destructive effect of the circuit under test is determined. All calculation is eliminated, the *loss* in the circuit due to all the most complicated causes is determined, and the relative value of the circuit fixed. It is necessary to make a number of tests on any given circuit in order to derive a reliable average. In this particular—dependence upon the personal judgment of the observer—the method is open to some criticism. Methods are now in process of development, however, by which this imperfection will be eliminated.

While it is possible to determine the loss in transmission in any circuit in terms of miles of standard cable, it is also possible to determine the loss in transmission to be expected from any part of the complete circuit. In this way the transmission loss through a great number of items of standard telephone equipment has been determined.

In Fig. 163 is shown a curve indicating the loss in transmission as the current flowing through the transmitter of a certain type of telephone instrument is decreased. This is a very instructive curve and is well worth the careful study of every telephone man. It will be readily seen from the curve that, with this particular transmitter, the transmission loss is 2.60 mile when the current through it is 0.12 ampere, and that as the current flowing through the transmitter decreases to 0.04 ampere, the transmission loss incurred is equal to that incurred by inserting 8.10 miles of standard No. 19 gauge cable into the standard circuit.

This curve is presented to illustrate the very complex composition of the total transmission loss incurred in any telephone circuit. Not only is the loss in transmission due to resistance, to capacity, and to inductance, but it is also partly due to the reduction in current supply to the transmitter, to the condition of the transmitter batteries in local battery telephones, to an unfavorable condition sometimes produced at the terminals of the circuit by the addition of equipment and to a number of other complicated and related effects.

466. *Importance of applying transmission measurements to existing conditions.*—It is, therefore, not sufficient that a given design of circuit shall be thoroughly operative from the mechanical standpoint. If it is to be incorporated into the working telephone plant, it should be carefully checked as to the effect upon the total transmission loss.

The writer has in mind a certain telephone company that found a transmission loss equivalent to over 50 miles of standard cable between its *toll* board and terminal rack, due to conditions that could be easily remedied. In other words, this company, making a bid for the long distance business in its city, compelled its patrons to carry on their conversations over equipment that *actually added the equivalent* of 50 miles of standard cable to the unavoidable loss in transmission. It is quite unnecessary to say that when this condition was definitely developed in the plant in question, steps were immediately taken to provide the proper remedy.

The importance of carefully checking out all the means used

in any given plant for telephone transmission as to their effect on the quality of the transmission, cannot be too strongly emphasized. Inefficient repeating coils, inefficient condensers, improper wiring, unnecessary resistance and insufficient battery current supply to transmitters are among the most common causes of large transmission losses.

(To be Continued.)

Keystone Telephone Earnings for July.

The Keystone Telephone Co., of Philadelphia, Pa., has issued its comparative statement of earnings for the combined companies for the month ended July 31, 1916, and for the seven months ended on that date, as follows:

	For month ended July 31, 1916	Year previous	For seven months ended July 31, 1916	Year previous
Gross earnings	$122,509	$114,204	$840,742	$784,825
Operating expenses and taxes	62,373	58,640	421,234	390,046
Net earnings	60,136	55,564	419,508	394,779
Less interest charges	27,453	26,940	192,170	185,605
Net surplus	$ 32,683	$ 28,624	$227,338	$209,174

A Western Story

The Second Contract—Public Ingratitude

By J. C. Kelsey

"No new public utility to render a service similar in character and location to the service rendered by any existing public utility in the state shall be constructed, maintained or operated without first obtaining a certificate of necessity and convenience from the public service commission."

Every reader is familiar with this lay which has been passed in practically every state in the Union. And thereupon hangs a tale which I shall tell as it has been told to me.

It is a story of peculiar interest to the owners of the millions of telephones which now have connecting agreements with the great universal system. It is a story of a contract renewal which particularly appeals to every Independent company because within a few years every ten-year contract will expire or will have expired.

The story appeals to me particularly since, in one week, three letters came in which complained of a change in contract which did not recall a single promise of the original deal.

Now the certificate of necessity has a pleasant sound to existing owners of telephone systems. Under the protection of a commission, the management of a local Independent telephone company feels at least that he cannot be attacked by the great Bell invader.

For years, directors and stockholders have lost untold numbers of nights' sleep, awakening from a hideous nightmare that the Bell company had unloaded a car of poles and had bought a lot.

The fear of such invasion kept the company in rented buildings and made the company appear something like the citizen who expected to leave between sunset and sunrise.

But the law of public necessity, at one stroke, restored sleep to troubled minds. The management began to feel a part of the community, and became as confident of existence as a farmer without a mortgage.

It began to build new and modern exchange buildings which were a credit to the town, and new switchboards, cables and materials were ordered.

Life began to be real for the local company and it did business as business demands, knowing it was secure from sudden invasion or loss of capital.

The telephone company in question, soon after the passage of the law quoted, put up a new building and installed equipment in keeping with the surroundings.

This company, being in the field first, had found it convenient to make a connecting contract and became a part of the great Bell system which so freely advertises its "ten million" telephones.

It seemed as if nothing would ever mar the happiness of this local concern. Not a cloud dimmed its telephone sky and nothing but drifting leisurely was left to the officers of this company.

But, the story goes, the ten-year connecting contract expired, and the confident Independents awaited a new one, exactly like the old one which contained so much promise.

But when the local people read over the new contract, it was a different one. Surprise turned to amazement and amazement to anger, and the contract was left unsigned.

Secure in their interpretation of the law quoted, they sat down to await the messenger from the universal company, feeling that they were secure in their local stronghold.

A year later, the Independent telephone management received a shock. The Bell company had applied for a franchise in this western city which had been presented with a new building and a new telephone system.

The universalists had applied for a certificate of necessity on the ground that they could not make a reasonable long distance contract with the local company. Further, the equipment of the local company was alleged to be unfit, and the construction not according to their standards.

Also a hardship was being placed on the city because the mayor might want to talk to the mayor of Amarillo in faraway Texas and the transmission might not be good enough.

Someone has said that a chain is no stronger than its weakest link. At this moment this column will bid for posterity by saying that a commission law is no stronger than the commissioners.

In this case, the commissioners went *"en banc"* to the western city to inquire into the situation.

Considerable handshaking was observed and my correspondent states the shakes with the Bell crowd somehow seemed to have more cordiality than with the Home crowd. Anyway, this might be expected of the fact that the Home crowd had become felons and no one is cordial to a criminal.

An automobile ride was taken and everything in the city received one encomium after another except, of course, the property of the Home Telephone Co.

Not a word was mentioned about the beautiful building of the Home company, not a sound about its credit, not a breath about its pioneering and giving service at a time when the universal company had refused.

Just as they used to call the municipal court of a certain city the "Court of Conviction," so seemed to be the stern-faced commissioners as they faced the Home company. The poor victim had no chance at all. If he floated he was guilty, and if he sank and drowned, he was innocent.

Finally one member of the commission made a suggestion, a very startling one, and of course a spontaneous one.

Why not buy the local company and give the mayor a chance to have good transmission if he should ever desire to talk to the mayor of Amarillo?

"Oh! we have tried to do so but the local management insists upon dollar for dollar. Such a proposition will not do because the building is valueless, the equipment hopeless and the construction ridiculous. We could not think of paying these misguided gentlemen more than 50 cents on the dollar."

Further, the letter says:

"Friends, neighbors, business associates, bankers (who carried our balances), and all advised us to sell and make way for the heaven of 'universal' telephone service.

One woman at the meeting accused the manager of spending his vacation at Glacier Park and thought he had made too much money already.

Later, our operators grew careless, the plant foreman began to dream of Western Electric equipment, the public began to complain, and the upshot of it all was that we sold at 50 cents on the dollar.

"They promised to spend $50,000 and employ 50 men for a year or so.

The hotels enlarged their capacity to handle the crowd, but somehow it was found that the poles were nearly new, the cable first class and the equipment really better than they thought. So no money would be spent and the 50 men would not be needed.

The rates are to be raised to $3.50 and $2, but the worst part of it is that friends, neighbors, business associates, bankers and all, who advised me to sell, are claiming that I threw the town down and deliberately sold them out."

Now follows the part of the story which is the inevitable ending of all love stories of this character—the public is not living happily ever afterward at all. It has begun to dawn upon them that ingratitude can sometimes be punished.

The commercial body questioning the new local Bell management is also learning something of value. The local Bell management (and no blame can be attached to it) knows nothing of any intended raise in rates, but, of course, is looking for a universal adjustment of rates by the public utilities commission in all towns where exchanges have between 500 and 1,000 subscribers.

A great many of these plants, it is contended, have not been paying and the rates would have to be raised. Further, if rates are to be standardized and universalized, all the local Bell management can do is to abide by the ruling of the commission.

My correspondent ends with a moral in which he plaintively asks:

"Does it pay to be on the square in dealing with the public?"

He has no word of censure for the Bell company, nor does he blame the wise member of the commission who made the suggestion of purchase. He feels hurt, after being compelled to sell on a 50 per cent. basis, to be accused by the very people who demanded that he sell, of throwing them down and selling them out.

Wherever the blame lies, the fact remains, nobody is going to be happy over the transaction.

If the Home telephone owner had been left alone, he would have gone along and made a fair living. The money he collected would have been deposited in the local banks, and whatever borrowing found necessary would have been done locally.

The supplies would have been purchased at home and not from the Bell factory branch, whose parent company buys brooms, furniture and such items in million-dollar lots.

The licensee Bell company, doing a friendly thing in following out the commissioners' suggestion, finds itself in hot water too. It teaches plainly that a local owner should be left alone.

It teaches also that changing a contract is dangerous. It stands to reason that a contract which is made today to remove difficult conditions is not the same tomorrow after conditions are removed.

Naturally, a contract which expires ten years from now cannot be expected to be renewed under the conditions of the first one. The very first contract makes the conditions of the second contract entirely different.

Telephone companies which have contracts for long distance must know full well that the new contract will call for changes not so favorable as the first. And it is safe to say that this second contract matter is a condition and not a theory which confronts over 3,000,000 Independent telephones.

Personally, I see no reason why the Bell people should have done otherwise. Why should they sign a new contract for conditions and circumstances which were alive ten years ago. They cannot be expected to be so utterly devoid of business sense as all that.

The local company naturally could not drive such a hard bargain as it did at first. At first the Bell company was simply happy to get the connection and willing to make any terms. Ten years later it was in a different position to enforce terms —and it enforced them.

No telephone manager need expect a second contract as good as the first.

This story is simply full of human nature; not a thing different could be expected on the part of any of the actors—not even the public.

A billion-dollar company has to protect itself as much as the $50,000 one, and one has no right to expect otherwise. A billion-dollar company can make mistakes as easily as a $50,000 one, and it did in this case where it bought out a happy local owner.

The billion-dollar company has its limitations and it shines out in small communities where it acquires a monopoly. The $50,000-company has its limitations when it attempts to compete or acquire a monopoly in a locality which requires millions.

In no business as in the telephone business is it so applicable that a back should be fit for its burden.

I do not agree with everyone about the telephone business. I believe that investors in a weak property should have a chance to get their money back by sale to a competitor or anyone willing to buy. I believe the public should pay and pay well for all its experiments in two telephone systems or systems similar to the one just described.

I believe the winner of a competitive contest should be allowed to buy the loser at the public's expense—but in no case should the loser by reason of being a part of a universal system, be allowed to buy.

I believe this local company in the western city should have been left in the hands of its local owners. I am sure the western city will heartily believe it, too, as time goes by.

When you sign a contract, remember that conditions change at once so much as to become unrecognizable even the next day, but it usually takes ten years to find it out.

MORAL: Even commissioners are human.

Use of the Telephone in Plattsburg (N. Y.) Encampment.

The telephone and telegraph are much in evidence at the Plattsburg training camp, Plattsburg, N. Y. In one of the accompanying illustrations may be seen the telephone orderly for targets 31 to 36 inclusive. The orderly is sitting on the ground, just in front of the second scoring table to the left, directly behind the men firing from targets 35 and 36. At the right center, just beyond the second man standing, the next telephone orderly may be seen. He is taking care of targets 24 to 30 inclusive.

The telephone orderly is the means of communication between the scorers and the markers in the butts. When the person firing questions the marking of his target, the orderly says: "Remark 33," or "Mark 33" or "What was position of miss on 33?" The orderly in the butts repeats these orders or questions to markers and repeats their answers. There are two telephone orderlies to each six targets. There were 36 targets on the range at Plattsburg.

There were between nine and ten thousand at the July encampment at Plattsburg, of which two regiments were composed of business men and two of undergraduate college students. These regiments all took the infantry training. The second year men were allowed to select special courses and made up two squadrons of cavalry; one signal corps company; one company of engineers; two batteries of field artillery and one machine gun artillery.

The telephone was not used very much in the field operations, generally known as the hike, but it was an essential part of the game on the rifle range.

Another of the illustrations shows Private Matthews, of the Sixth regiment, Company L (otherwise known as Claude L. Matthews, vice-president of W. N. Matthews & Brother), with full equipment for a hike. The average day's hike was 10 miles and the total weight of the equipment about 60 pounds.

"One thing, above all others that the rookey learns at Plattsburg," Mr. Matthews states, "is that an army cannot be trained in a few days. While they did marvelous things with us, I venture to say that we would not be fit for field service in less than a year's time.

"The result of the training is, it makes everyone feel that universal service is a thing to be highly desired. It will be a great thing for the nation and force the rich man and the poor man and all who lie between, to take at least a month out of each year and make him physically fit. For $25, one gets a training that is superior to the training which many wealthy men take from Muldoon, to put them back on their feet, at $60 per week."

Corporal Borden.

Private Matthews.

Corporal Borden, a snapshot of whom is reproduced in an accompanying illustration, is a man who has frequently taken Muldoon's training. He went through all the Plattsburg experience without an ache or pain, in spite of the fact that many a younger man was forced to drop out because he could not stand the pace.

Corporal Borden is 60 years of age and is a grandson of Gail Borden of "Condensed Milk" fame. He is said to be "the best sport in the Sixth regiment and the pride and joy of Company L." Corporal Borden also obtained the title of marksman on the rifle range.

The Telephone Orderly in the Training Camp at Plattsburg, N. Y.

Plans for Big Convention in Indiana.

The annual convention of the Indiana Independent Telephone Association, which is to be held on Thursday and Friday, September 14 and 15, at the Claypool Hotel, Indianapolis, Secretary F. E. Bohn states, promises to be the biggest and best convention in the history of Independent telephony in Indiana. The program committee is now hard at work preparing even a more interesting and instructive program than in past years, announcement of which will be made later.

At the same time that the convention is being held, an operators' school will be conducted for the benefit of the operators of the member companies of the Indiana association. W. S. Vivian, of Chicago, secretary-treasurer of the United States Independent Telephone Association, and F. V. Newman, of Grand Rapids, Mich., secretary-treasurer of the Michigan Independent Telephone & Traffic Association, will be in charge.

Growth of Telephone Service in London.

Since the war broke out, it is reported that the London post office engineering department has had to maintain 53 telephone exchanges and 12,000 private branch exchanges. In addition 251,142 telephones were maintained in that district, which was equivalent to one-third of the telephone service of the United Kingdom. Over 300,000,000 calls originated in the metropolitan area last year. There were 600 telegraph offices, and the central telegraph office was the largest in the world, and it dealt with one-third of the 91,000,000 messages which were sent out every year over cables 70,849 miles in length.

Complaints regarding the telephone service had been reduced from 1.25 per thousand lines to 0.5, and investigation of these showed that the users were the sinners more often than the post office. The private branch exchanges have grown largely, and there are about 7,000 government exchanges.

Wisconsin Telephone Co. to Erect Main Office Building.

The Wisconsin Telephone Co. has just taken out a building permit for the erection of a new $700,000 main office building. The structure will be eight stories in height and will be located on the east side of Broadway, between Mason and Wisconsin Streets, Milwaukee, Wis.

Digest of Telephone Articles in Various Publications

Prepared by Arthur Bessey Smith

GRIMSBY AUTOMATIC EXCHANGE, by F. McMorrough. Post Office Electrical Engineers' Journal, Vol. 9, Part 2, July, 1916, pages 86-129; 13 diagrams, 11 half-tones.

The exchange described is of the German Siemens & Halske type, employing numerical switches made like the old Strowger switches, having three banks (one private bank and two line

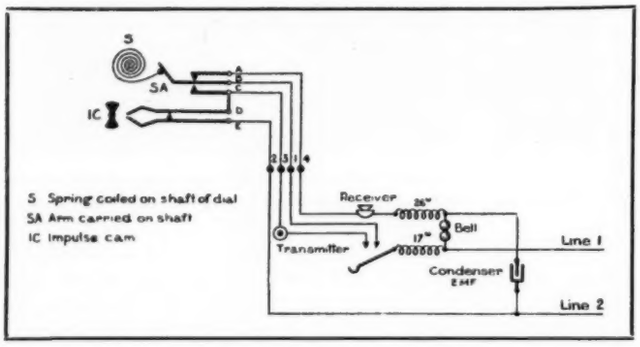


Fig. 4. Subscriber's Dialing Arrangement.

banks). The line switches are rotary "preselectors," of which primary and secondary switches are used. The article begins with a brief description of the trunking system used in automatic switchboards, showing first the function of a connector switch, and proceeding from this to a thousand-line board having first selectors and connectors.

The calling device is very similar to that made by the Automatic Electric Co. in America. Mechanically, it consists of a finger-hole dial with a returning spring, gear wheels, a governor, and a cam for operating the impulse springs. Electrically, it consists of the single pair of normally closed impulse springs in the main line and three auxiliary springs for cutting out the talking apparatus while sending impulses (Fig. 4). The operation is "two-wire." The initial closing of the line by taking off the receiver from the hook prepares the switchboard circuits; the calling device sends several series of breaks in the circuit which set up the connection; and the final opening of the line causes the release of the switches.

The preselectors (Fig. 6), of which there is one for each subscriber's line, stand on a normal contact, from which they rotate to select an idle trunk out of ten trunks. The rear of the contact bank has its terminals staggered so as to permit the banks to be multipled together by straight, bare wires. The trunks from these preselectors run to secondary preselectors, so as to permit 1,300 subscribers' lines to pass from 1,300 primary preselectors, through 160 secondary preselectors, to 80 first selector switches. This is similar to automatic practice in America which employs primary and secondary Keith line switches.

According to the circuit of trunk-grouping arrangement, Fig. 15, an intermediate distributing frame is located between the connector banks and the line side of the preselectors, to permit any preselector to be connected to any switchboard number. Trunks from a manual board come in to first selectors, whose banks are multipled to the banks of the local first selectors. There are for each hundred lines, ten ordinary connectors, one test connector, and one for toll work.

The writer gives a detailed description of the electrical circuits and their operation in setting up a connection and releasing. The first selector feeds talking current to the calling telephone, and the connector does the same for the called telephone. The line relay of the selector operates the vertical magnet from a front contact instead of from a back contact as is usual in American practice. Slow-acting relays co-operate with quick-acting relays in controlling the various magnets.

When the first selector has completed its selection, it is converted into an impulse repeater, to send impulses to the second selector and the connector. The second selector is seized by means of the release trunk (third wire) which prepares the switch for operation. The impulses come from the first selector over one wire of the trunk to the second selector, returning through earth. The rotation of either selector to find an idle trunk is done by means of machine-generated impulses (which drive the rotary magnet).

The connector is also seized by means of the release trunk The second selector carries the lines straight through from the first selector, so that the connector is operated by impulses from the first selector over one wire and earth return. The switches are held in the operated position by current in the release trunk, but this is not a continuous wire, for it is in three sections. The talking circuit (Fig. 24) is broken at two points by condensers, and there are four bridges across it, all containing battery.

The release is under the control of the calling subscriber though a "blocking" alarm is provided which will operate if the calling subscriber does not release within a specified time after the called subscriber has hung up his receiver. If a service

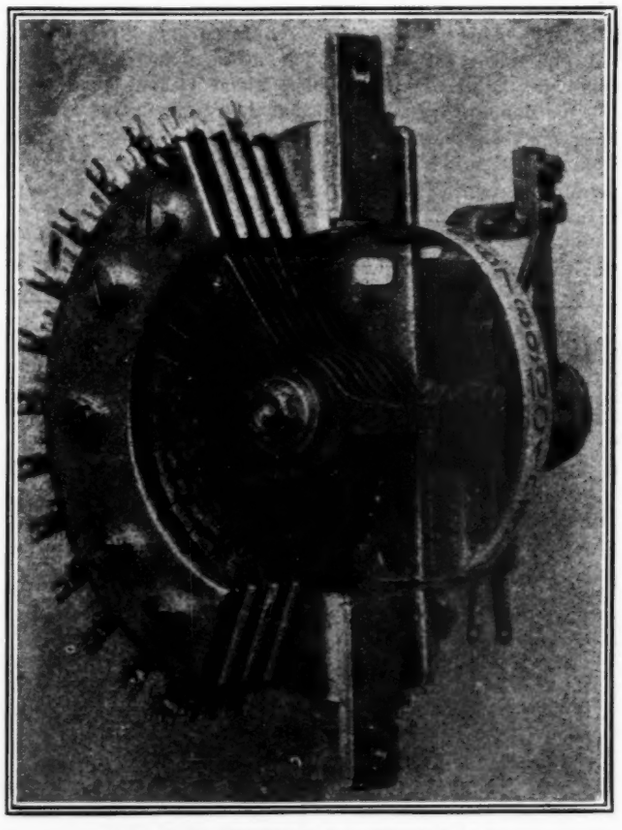


Fig. 6. First Preselector, General View.

meter is used, it is operated over the third wire at the time of release of the connection.

Calls from the manual exchange are dialed by the operator, but when the connection has been set up, the line is cleared and battery current supplied to the telephone directly from the manual exchange. This permits the subscriber to signal the

operator in the usual way. If the called line is busy, a flashing signal is given to the operator.

The arrangement of trunks to P. B. X.'s is a little unusual. Three figures only are in the call number, though regular lines have four. The first two digits of the call number carry the

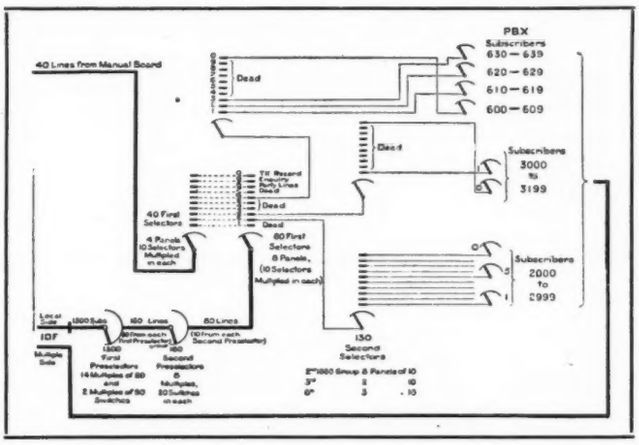


Fig. 15. Outline of Circuit Grouping Arrangement.

connection through the first and second selectors. From each level of the second selectors which is devoted to P. B. X. trunks run trunks which terminate in "discriminators." Each discriminator is a flat type switch having 25 sets of contacts (five contacts per set). To these contacts are multipled the P. B. X. trunks, arranged in whatever grouping is desired.

Associated with the discriminator is a "digit" switch, looking much like a preselector. When the subscriber dials the last figure in the call number, the digit switch moves in response to the impulses and stops when the impulses cease. The discriminator then rotates its wipers until they find the group of trunks indicated by the position of the wipers of the digit switch, after which they select an idle one out of the group.

A number of fault alarms are provided to indicate both visually and audibly when anything goes wrong, such as the blowing of fuses, etc. The time-lag device used in connection with those alarms which need it, consists of a cam on a low-speed shaft of a ringing machine. There are also alarms to indicate when all the trunks of a group are busy.

Toll connections are obtained by dialing "O" as usual, which trunks the subscriber to a recording clerk. The toll operator calls the subscriber by means of the regular connectors. If the subscriber's line be busy, the toll operator can use a "toll offering" connector (one per hundred lines) and get in on the busy connection to give the subscriber the chance of receiving the toll call if he considers it of more importance than the local connection.

LONDON-BIRMINGHAM-LIVERPOOL LOADED CABLE. RESULTS OBTAINED IN FINAL TESTS OF BIRMINGHAM-LIVERPOOL SECTION. Post Office Electrical Engineers' Journal, Vol. 9, Part 2, July, 1916, pages 130-134; two tables and two curves.

The scheme for connecting the three English cities by means of loaded cable has been realized, and the cable is in operation. The London-Birmingham section was described before (Vol. 8, Part 3, this journal, October, 1915). The specifications as to type of cable, type, inductance and spacing of the loading coils, and the methods to be followed in balancing the cable were drawn by the post office engineers. The cable was made by one manufacturer and the loading coils by another. Coils

Weight, per mile per wire (lb.).	Diameter.		Direct current tests.				Alternating current tests ($\omega = 5000$).
	Inches.	Mm.	Resistance, ohms per mile (loop)	Inductance, henrys per mile (loop).	Insulation, megohms per mile (loop).	Capacity, mf. per mile (loop).	Attenuation constant β per mile.
300	·137	3·48	6·28	0·058	6750	0·0545	0·00413
200	·112	2·841	9·19	0·054	17610	0·0572	0·00618
150	·097	2·461	12·44	0·052	27600	0·0685	0·00846
150	Phantom	Phantom	6·22	0·033	—	0·1008	0·00682
*100	·079	2·009	17·32	0·053	39600	0·0575	0·01014
100 }	Side	—	17·90	0·053	32670	0·0579	0·01057
100 }	Phantom	Phantom	8·95	0·034	—	0·0864	0·00837
300	,,	Not yet loaded	Not yet loaded	Not yet loaded	Not yet loaded	0·0857	—
200	,,	Do.	Do.	Do.	Do.	0·0853	—

* Not phantomed

Direct and Alternating Current Tests, Mean Results Per Mile.

were spaced two and one-half miles apart. The accompanying table gives the results of direct and alternating current tests, the cable length being 90 miles.

The variation of attenuation constant with frequency was obtained from an angular velocity of 2,000 to 7,000. The increase varied between the different sizes of conductors, being usually from 25.5 per cent. to 30.9 per cent. with one exception, 15.8 per cent. More pronounced is the variation of the at-

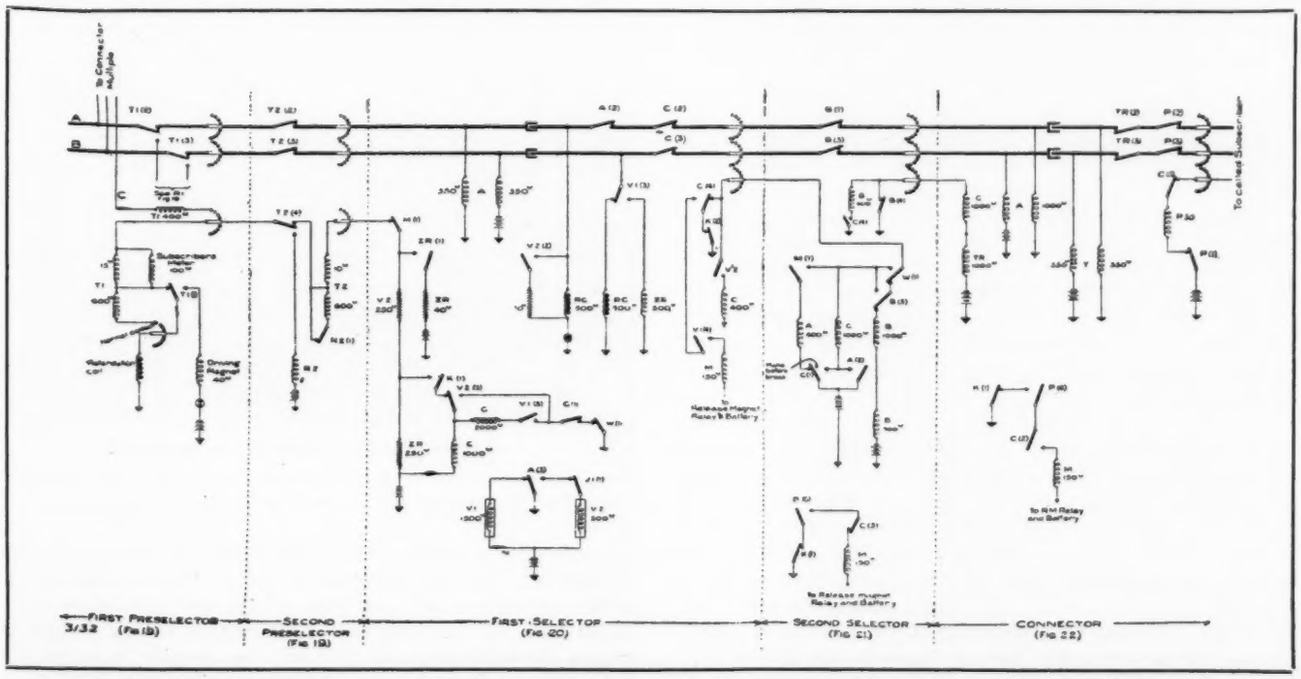


Fig. 24. Calling Subscriber's Circuit During Conversation (Illustrating Release of Connections and Registration of Calls).

tenuation constant with current strength, varying rather uniformly from 0.0101 at 0.5 milliampere to 0.0108 at 4.15 milliamperes, in a 110-pound conductor. Speech tests gave the results shown in the table below ("S. C. E." means "Standard Cable Equivalent").

	Type of conductor					
	300-lb.	200-lb.	150-lb. side	150-lb. phantom	100-lb. side	100-lb. phantom
S. C. E. of circuit in miles of standard cable..	4.25	5.3	7.7	5.9	9.2	7.7

LONG DISTANCE AND CABLE TELEPHONY (UNDERGROUND AND SUBMARINE). Part II, by B. S. Cohen and J. G. Hill. Post Office Electrical Engineers' Journal, Vol. 9, Part 2, July, 1916, pages 135-155; 12 curves and one table.

This article reviews the present practice in speech transmission in England, giving many results of tests which have been made on apparatus and lines. It is unfortunate that American practice is not as adequately presented in any publications.

The efficiency of the speaking apparatus plays an important part in long distance telephony. Articulation in transmitter

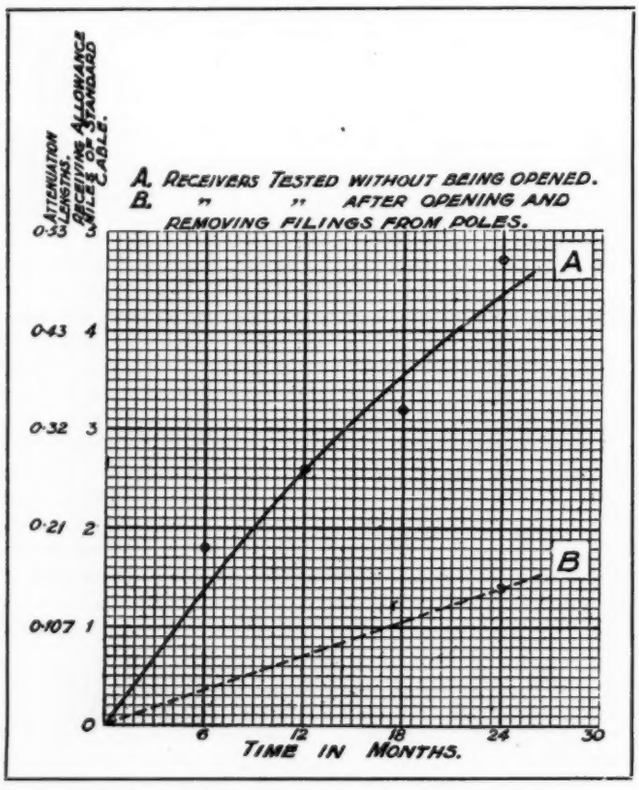


Fig. 6. Ageing of Common Battery Receivers.

and receiver is of prime importance. It is hoped that ultimately articulation may be tested quantitatively by measuring the output at various frequencies and plotting a curve, which is to be compared with the curve of apparatus of known articulation efficiency.

Side tone, or the speech interaction of the sending transmitter on its own receiver, depends to some extent upon the volume efficiency of the transmitter and receiver. Generally, transmitters of light design are more sensitive to extraneous noises than those whose parts are heavier. Ageing is an important factor. Some types of transmitters, notably those with heavy diaphragms, have been found to improve with age (in one case ten years). Receivers deteriorate at a rapid rate, due chiefly to the weakening of the permanent magnet. Twelve 60-ohm common battery Western Electric receivers were sealed and put into normal use for two years and tested every six months (Fig. 6. Curve *A*). The loss fell to the value of curve *B* on cleaning the diaphragms and pole tips.

The standard cable used in testing has the properties, based on 800 cycles per second, given in the accompanying table.

The effect of talking with the mouth farther from the trans-

Factor.	Constants per mile of loop.	Constants per kilometre loop.
Resistance	88 ohms	55 ohms.
Capacity	·054 microfarads	·0337 microfarads.
Inductance	1·0 millihenrys	·621 millihenrys.
Leakance	1·0 micromhos	·62 micromhos.
Complex attenuation constant or Propagation constant	$\cdot 154 \angle 46° 6'$	$\cdot 0956 \angle 46° 6'$
Simple attenuation constant	·106	·0662.
Wave length constant	·111	·0689.
Wave length	56·6 miles	91·1 kilometres.
Wave velocity	44,900 miles per sec.	72,300 kilometres per sec.
Characteristic impedance	$571 \angle 42° 50'$	$571 \angle 42° 50'$

Standard Cable Values.

mitter than it should be, is shown by the curves of Fig. 7. This test was made on a Western Electric transmitter.

The commercial limit for transmission depends upon the absence from extraneous noise both in the room and on the line. With the apparatus in absolutely first class condition and ideal quiet on line and in rooms, expert telephone users have carried on conversation over 55 miles of standard cable, it being necessary to repeat about 4 per cent. of the words. The limit dropped to 44 miles if the usual noises of a rather quiet office were permitted, and 8 per cent. of the words had to be repeated.

The line disturbances are indefinite and variable, which made investigation difficult. Five kinds of disturbances were tried, (a) ordinary cross talk; (b) hand-sent Morse signals; (c) phonophore signaling; (d) variable frequency alternating current disturbance as from electric railway; and (e) scraping noise often heard on lines due to dry joints or swinging

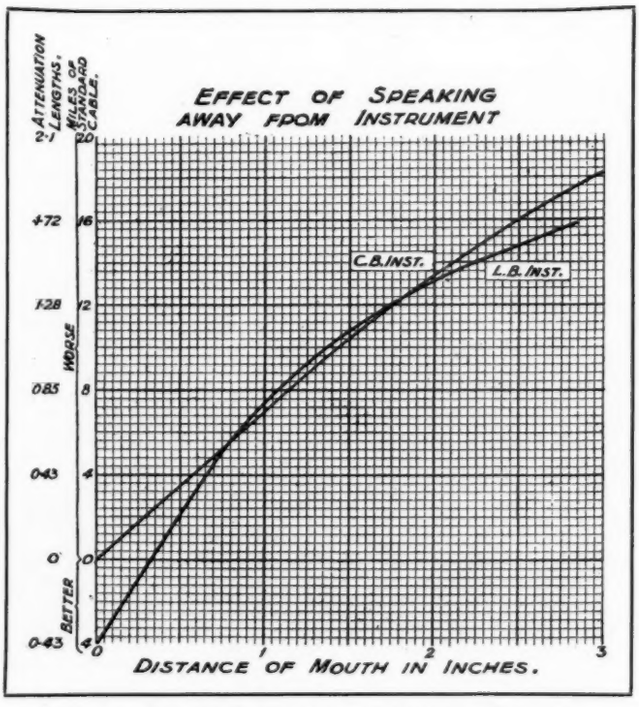


Fig. 7. Results of Speaking at Different Distances.

grounds. On a 40-mile standard line, none of the disturbances caused any loss in transmission except the scraping noise, which caused a small percentage of the received conversation to be lost. With 45 miles, the alternating current induction caused about 50 per cent. loss and the scraping noise 20 per cent. Hence these two are the most serious factors in long

distance transmission. It is stated that the limiting standard which it is proposed to adopt in Great Britain is 47 miles of standard cable over all, or an attenuation length of 5.

An exhaustive study has been made of the transmission value of the local line (subscriber's loop). Three systems are in use:

A is a manual system with repeating coils;

B is a manual system without repeating coils; and

C is an automatic system without repeating coils.

The sending allowance to be made for the local line depends upon the current fed to the transmitter, so that the curves are drawn to resistance. The receiving allowance depends more upon the equated value of the cable in the local line, so this is used in plotting curves. The particular transmitter used has a great effect on the sending loss as shown by the curves in Fig. 10. Curves *A* and *B* are the lowest and highest of seven transmitters tried on 10-pound cable.

In all telephone circuits there is a certain amount of apparatus necessary for signaling, etc., which adds to the transmission loss. The series apparatus is usually of low resistance, yet introduces a loss not less than 0.4 mile of standard cable. Shunted or bridged apparatus is made of high impedance. At 800 cycles per second, the 200-ohm coil used to feed 48-volt current to one side of the line has from 2,000 ∠45 to 5,000 ∠45 ohms impedance, depending on the conditions of the test. The ordinary magneto ring-off indicator (drop) has about 0.5 mile loss.

Party lines cause additional loss. If the branch lines are short so that the capacitance does not exceed 0.03 mf., the loss may be taken as 0.05 mile of standard cable per station. If the branch lines become much longer, so that the effect of the bells is less and that of the lines more, the loss in miles of standard cable is approximately equal to ten times the additional capacity in microfarads. The same may be applied to the capacitance added to a line by switchboard cabling.

Terminal and transition effects with loaded lines have been investigated. The effective resistance of a Western Electric telephone with its repeating coil current supply has been measured for all frequencies up to 1,600 cycle per second. From this data, we are in the position to consider the actual terminal losses when connected to loaded lines. Fig. 13 gives the actual losses for this type of common battery termination when connected to loaded lines varying in impedance from 800 to 3,000 ohms. Four curves are given, for local lines of 0, 2, 4, and 6 miles of standard cable re-

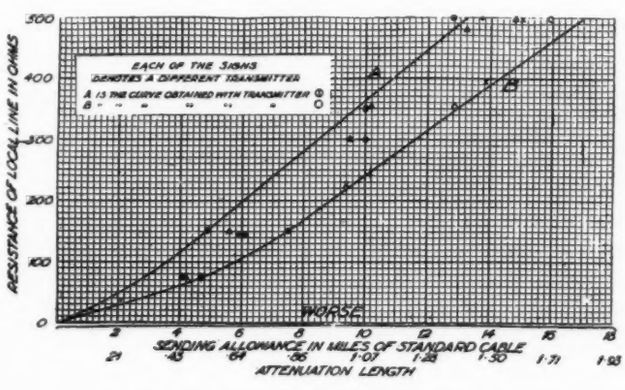


Fig. 10. Sending Allowance Curves.

spectively. They give the loss at both ends of the loaded line (half the value is at each end).

One method for reducing the terminal loss is the use of terminal transformers whose windings have impedances in the ratio of 1 : 2 or 1 : 4. The latter ratio is better for lines with impedance of 1,100 ohms and upwards with zero terminal loop, also for lines of 1,300 ohms and upwards with terminal loops up to two miles. Curves are also given for the transition loss between unloaded lines of about 15 miles (equated) length and loaded line, also between lines having different loading.

Private branch exchanges are fruitful in transmission loss due to the signaling and current-feeding apparatus. In some cases it is possible to have a combination whose total loss when connected to a loaded junction line, is less than its equated value.

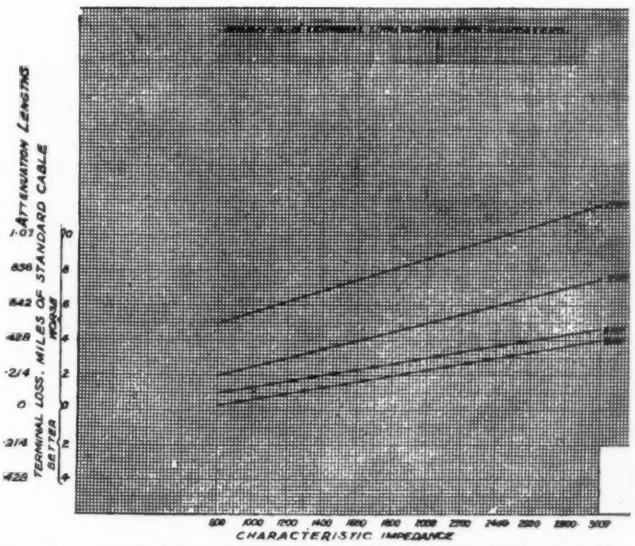


Fig. 13. Actual Transmission Losses in Miles of Standard Cable.

In conclusion, the authors feel that the most reliable and effective means for increasing the range of long distance transmission is by loading. Other means, such as voice relays and more efficient transmitting apparatus, are being closely studied and look promising.

Pacific Company to Build New Exchange at Coronado, Cal.

Plans have been completed by the Pacific Telephone & Telegraph Co. for the erection of a new concrete exchange at the corner of Eighth street and Orange avenue, Coronado, Cal. The cost of the structure is estimated at $6,000 and the cost of the new equipment to be installed upon the completion of the building will be in the neighborhood of $25,000. It is expected that the exchange will be ready for occupancy by February 1, 1917.

Telephone Systems of Argentina, South America.

In Buenos Aires, Argentina, South America, there are two telephone systems in operation—the Compañia Unión Telefónica and the Compañia Cooperativa. The former, which is the larger, also maintains exchanges in Rosario, Bahia Blanca, La Plata, Cordoba and other cities of Argentina. It is understood that efforts are being made to secure a concession for the installation of a new automatic system of American manufacture in the city of Buenos Aires.

To Rebuild Liberal (Kan.) Exchange.

The Liberal Telephone Exchange, of Liberal, Kan., will shortly begin work on the rebuilding of its entire system. A new two-story exchange building, new central office equipment and the placing of wires in the business section underground, are included in the plans. The improvements will cost in the neighborhood of $20,000.

Dryden, Ontario, to Have Municipal Automatic System.

An order has been placed by the town of Dryden, Ontario, Canada, for the installation of a complete municipal automatic telephone system.

Investigation of Pacific Properties in Washington

Fair Value of Entire Property of Pacific Company in State of Washington Fixed by Commission, Upon Which Equitable Rates Can Be Made—Present Rates Inadequate to Yield Fair Return—New Set of Rules and Regulations Adopted

The Washington Public Service Commission, on August 5, handed down its decision on the investigation of the operations of the Pacific Telephone & Telegraph Co., in the state of Washington, which was begun last January upon the commission's own motion. The purpose of this investigation was with a view to establishing a fair valuation upon which equitable rates can be made.

Fair Value of Pacific Telephone Property.

The fair value of the entire property of the Pacific company in the state of Washington, or rate base from which should be estimated the fair and reasonable return, is placed by the commission at $19,382,209 as of December 31, 1914. Rates will be determined from this sum, or such part thereof as is used for public convenience at the date of establishing such rates. The cost of reproduction new of the company's properties was placed at $17,147,592.

The average earnings on exchanges were found to be far from excessive. Relative to the matter of rates, the commission's opinion states:

"The exchange rate schedules from which these earnings have resulted have been those which the company itself determined. It is a reasonable assumption that they have named rates therein that they felt would sell the service and encourage development. To show an adequate return upon the investment at the present time, it is manifest that these rates in the aggregate would have to be raised. It is the belief of the commission that the company would not name rates which would fail to show earnings unless they felt that they could not exact higher rates without restricting development.

Consequently, as these rates in the aggregate do not show a reasonable rate of return, it appears to the commission that at the present time, if the exchange rate situation is approached upon any other basis than that of rates which will conserve and develop the business and yet be acceptable, the exchange rates in the aggregate would have to be increased."

New Rules and Regulations Adopted.

The commission ordered the termination of all contractual relations under which some 8,000 subscribers in 1914 were receiving service at rates at variance with the rates in the schedules now on file with the commission.

The commission found it necessary to formulate and draft an entirely new set of rules and regulations. As a result of conferences between the commission's engineers and enginers of the Pacific company, the following set of rules which appears to be satisfactory and eliminate all causes for complaint which have been made against former rules and regulations, has been filed by the company:

Rule 1.

Applicants may be required to sign an application furnished by the company, for the service to be rendered, and to establish their credit as provided in these rules as a condition precedent to service.

The applicability of rates for business and residence service, and for public or private business service, shall be governed by the obvious or actual use made of the service.

Rule 2.

All applicants for measured or coin box exchange service at the time of applying for service shall be required to establish their credit under one of the following methods:

(a) Ownership of Premises.—An applicant who owns the premises in which telephone service is to be installed may establish credit by signing a certificate provided by the company certifying to the ownership. The company will accept the signed certificate as satisfactory evidence of ownership in the absence of any definite knowledge to the contrary.

(b) Guarantor.—An applicant may establish credit by furnishing a guarantor satisfactory to the company, the applicant to obtain the signature of the guarantor on a guaranty form provided by the company. Any applicant furnishing a guarantor not acceptable to the company must establish credit under (a) or (c).

(c) Cash Deposit.—An applicant may establish credit by making a cash deposit as hereinafter provided. Receipts shall be issued for all such cash deposits.

(d) Subscribers as of the effective date of these rules and regulations.—All subscribers receiving service as of the effective date of these rules and regulations will have established their current credit under this rule.

Rule 3.

All applicants for measured or coin box exchange service who establish credit by making a cash deposit shall make a deposit in the following amount:

(a) The deposit required from applicants for business measured or coin box exchange service shall not be in excess of twice the monthly rate for the service.

(b) The deposit required from applicants for residence measured or coin box exchange service shall not be in excess of the monthly rate for the service.

Rule 4.

Subscribers who have initially established their credit otherwise than by a cash deposit and later fail to pay their bills shall be required to make a cash deposit to guarantee the payment of charges under the following regulations:

(a) The deposit required from a business measured or coin box exchange subscriber who has impaired his credit shall not be in excess of twice his average monthly bill, based upon the two months preceding the month in which impairment occurs.

(b) The deposit required from a residence measured or coin box exchange subscriber who has impaired his credit shall not be in excess of twice his average monthly bill, based upon the two months preceding the month in which the impairment occurs.

Subscribers subject to this rule who refuse to make a cash deposit may be denied further service, but only after the lapse of at least 15 days after the receipt by the subscriber of the company's notice that service is subject to discontinuance.

Rule 5.

Subscribers who have made a cash deposit and fail to pay all charges due are subject to the following rules:

(a) The deposit may be applied in so far as necessary to cover all charges due.

(b) If the deposit equals or exceeds the charges due, the subscriber may be required to make a new deposit as provided by Rule 4. The total deposit shall not exceed that required by Rule 4.

(c) If the deposit does not equal the charges due, the subscriber may be required to pay the remaining amount after applying the deposit, and make a new deposit as required by Rule 4.

Rule 6.

All bills against subscribers receiving measured or coin box exchange service shall be rendered monthly in arrears and shall contain a notice to the effect that the bill is then due and payable and unless paid within 15 days after receipt of bill, the service is subject to discontinuance without further notice.

Rule 7.

The company may extend credit for toll or telegraph service to any subscriber under the following rules:

(a) If a subscriber avails himself of the convenience of toll or telegraph service and fails to pay the charges therefor, after reasonable notice, the company may deny the convenience of further toll or telegraph service until the subscriber pays the amount due and makes a deposit, not in excess of twice the amount that was due, to cover charges for future toll or telegraph service.

(b) If a subscriber who has made a cash deposit fails to pay his bills for toll or telegraph service, the deposit may be applied to the subscriber's account for toll or telegraph service.

in so far as it will apply. The subscriber will be required to pay his bill in full and may be required to restore the deposit to its original amount before further toll or telegraph service is supplied.

RULE 8.

A cash deposit to guarantee payment for measured or coin box service that has not been impaired for a period of 12 months from the date of establishment of service, shall be returned to the subscriber at the end of the 12 months' period. In the case of an impairment of a deposit, the deposit shall be returned to the subscriber only after it has remained unimpaired for a period of 12 months from the date of the last impairment.

When service is discontinued any deposit may be applied to the charges on the closing bill. The amount of any deposit in excess of the charges shall be returned to the subscriber.

RULE 9.

A cash deposit that remains unimpaired for a continuous period of 12 months subsequent to the establishment of service, or from the date of last impairment, shall bear interest at the rate of 6 per cent. per annum for such 12 months' period. No interest shall be paid if service is discontinued within less than 12 months from the date of establishment of service.

RULE 10.

All applicants for business or residence flat rate service shall be required, upon the establishment of service, to pay in advance the charge for the service for the period of which bills are regularly rendered as specified in the rate schedules.

All bills for flat rate service may be rendered in advance for the periods specified in the rate schedules, and may contain a notice that the bill is due and payable when received, and that service is subject to discontinuance without further notice unless the bill is paid within the period specified therein.

RULE 11.

The company shall furnish at its own expense all instrumentalities to provide service covered by its rate schedules.

All instrumentalities provided shall conform with the company's established construction standards.

The company may refuse the installation of service that is not to be immediately used or is unreasonable in character, subject to appeal to the Washington Public Service Commission.

RULE 12.

The company will provide, at its own expense, all reasonable extensions necessary to serve applicants in accordance with its published rates filed with the Washington Public Service Commission and in accordance with its established construction standards.

Any extension which in the company's judgment is unreasonable or should not be made at sole cost to the company may be refused, subject to appeal to the commission by an informal application.

Any extension which is not to be made at the company's sole cost shall be covered by a written agreement between the company and the applicant, defining the terms and conditions under which the extension is to be constructed.

RULE 13.

The forms mentioned in the foregoing rules for application for service, certificate of ownership, guaranty, receipts for deposits, and a copy of each written agreement as provided for in Rule 12 shall be filed with the Washington Public Service Commission.

RULE 14.

A service connection charge of $3.50 shall be made to all applicants for the establishment of service at any location, provided that no service connection charge shall be made to applicants who sign for service to be rendered by the use of telephone instruments as then in place, and further provided that no service connection charge shall be made to applicants for farmer line service nor for private branch exchanges and intercommunicating systems, except as hereinafter provided for in Rule 15. Any change in the installation required by the subscriber will be made subject to the established charges therefor.

A charge of $1 will be made for restoration of service when service has been temporarily disconnected on account of nonpayment, subscriber's temporary absence, or for any other reason for which the subscriber is responsible, except a change in class of service or location of facilities. Where service is temporarily disconnected for which the subscriber is responsible, the exchange service charges shall apply during the period of disconnection.

RULE 15.

The minimum charge for service, the rates for which are quoted on a monthly basis, shall be the published monthly rate, and the minimum charge for service, the rates for which are quoted on other than a monthly basis, shall be the published rate therefor; provided that the minimum charge for farmer line stations shall not exceed the rate for six months' service; and further provided, that, at any location, service may not be taken for a period less than herein specified, excepting that the aggregate of the charges for private branch exchanges, inclusive of intercommunicating systems, shall not be less than an amount equal to the annual rate plus the cost of installation and removal.

Educating the Public by Means of Newspaper Editorials.

The Louisville (Ky.) Herald recently proved itself a friend to the telephone operators and the telephone managers, as well as the community in general by an editorial comment which put a good deal of stress on pleasant manners and reasonable patience in the use of the telephone. It also gave those people who are always ready to "jump on central," for the mistakes that are their own, something to think about. Telephone exchange managers could very often get a similar bit of help by inducing the publishers of their local papers to publish similar editorials from time to time.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Work of Service Division of Illinois Commission.

A recent issue of the Public Utilities Bulletin, which is published monthly by the Illinois Public Utilities Commission, contained a brief discussion of the work of the service division of the Illinois commission. This division was organized in 1914 and consists of a service engineer located at Springfield and seven assistant engineers traveling out from headquarters respectively located in territories covered by them, all under the direction of the engineering department. A service engineer and two assistants are located at Springfield, in addition to which an assistant engineer is located at Chicago, Peoria, Aurora, Centralia and Champaign.

The following case is typical of the work done by the service division of the Illinois commission:

The investigation of a certain telephone system by an engineer of the service division showed the local exchange to be poorly maintained and inadequately equipped, and the outside distribution lines to be in an unsafe condition due to the presence of high voltage electric wires. Recommendations were made for the rehabilitation of the lines, for clearing up the exchange by the replacing of unsightly and unsafe wires, for the establishing of adequate lightning protection, for the repairing of the switchboard, and for the providing of additional equipment. None of these recommendations necessitated any great layout of capital, the entire rehabilitation being done at very small expense compared to the notable improvement secured in the service.

Penalty for Failure to Comply With Commission Order.

By stipulation of the attorneys, Judge Stevens of the Circuit Court of Dane county, on August 22, entered judgment against the Door County Telephone Co., of Sturgeon Bay, Wis., and

in favor of the state for a penalty of $700 for failure of the company to comply with the orders of the Wisconsin Railroad Commission.

In November, 1914, the commission ordered the company to make certain improvements and directed that monthly reports be filed with the commission giving the progress of the instaliation work. The commission alleged that the company failed and neglected to file reports and an action on fifteen separate counts was brought. The state demanded a penalty of $10,000 in each case, making a total of $150,000. By stipulation the minimum penalty of $100 was imposed for each of the first seven cases and the other eight cases were dismissed.

N. H. Commission Recommend New Exchange at Durham.

The New Hampshire Public Service Commission has issued a report recommending the establishment by the New England Telephone & Telegraph Co. of an exchange at Durham, New Hampshire. At a conference on August 3 between the commission, representatives of the company and subscribers, it appeared that a majority of the subscribers favored the establishment of a new exchange. The commission's report is based upon this preference.

The establishment of a new exchange will reduce toll charges to and from Durham and will result in the institution of a five-cent charge between Durham and Newmarket in place of the existing unlimited service between the latter points.

Summary of State Commission Hearings and Rulings.

INDIANA.

August 12: Acting upon the petition of the citizens of Connersville for a revision of the rates of the Connersville Telephone Co., the commission issued an order fixing the company's rates as follows:

Business telephones (individual lines), $2.50 a month; two-party lines, $2 a month; residence telephones, $1.50, $1.25 and $1 a month; extensions, 50 cents and 25 cents; rural telephones, $1.40.

A discount of 15 cents a month on business telephones for prompt payment, and of 10 cents a month on residence telephones is provided. The charge to new subscribers for installing telephones was ordered discontinued.

The present value of the company's property "used and useful by the public" was fixed at $124,780, including a working capital of $1,200 and a going value of $5,000. A depreciation allowance of 5 per cent. of the physical value, less material and supplies, also was made.

It is estimated by the commission that these rates will give the company a return of 7 per cent. on its investment.

KANSAS.

September 12: Postponed hearing on application of the Missouri & Kansas Telephone Co. for permission to increase its rates at Wellington, Kan.

MICHIGAN.

August: Complaint filed by the Continental Motors Co. relative to the long distance telephone service to and from Muskegon, Mich.

MINNESOTA.

August: The Nicollet County Telephone & Telegraph Co. surrendered its franchises at St. Peter, Kasota, Cleveland, Nicollet, New Sweden, Lafayette, Gibbon and Gaylord and will operate under an indeterminate permit as provided by the 1915 laws of Minnesota.

August 18: In an informal ruling, the commission ordered the Northwestern Telephone Exchange Co. to eliminate discrimination in its toll charges at Bird Island, Graceville, Granite Falls, Morris, New Ulm, Olivia, Sleepy Eye and Redwood Falls. Complaint was made by subscribers at the places just mentioned relative to the company's tariffs under which a subscriber whose toll charges exceed $5 per month is given his residence or business telephone free of charge for that month, while a person who does not use the toll line to that extent must pay the regular rental. The cancellation of the rental charges, under such circumstances, the commission opines, is in effect giving free service and is likewise a discrimination and in violation of the Minnesota statutes. The company is therefore requested, in an informal ruling, to cancel this provision of its rules and regulations by the filing of new tariffs which comply with the law.

August 19: The commission granted the application of the Tri-State Telephone & Telegraph Co. for permission to increase its rate for business telephones at Moose Lake, Minn., from $1.50 to $2 per month and its residence rate from $1.25 to $1.50 per month, effective September 1.

MISSOURI.

August 22: The commission handed down its decision in Case 889, the Farmers' Mutual Telephone Co., Jonesburg, Mo., vs. the Kinloch Long Distance Telephone Co. The Farmers' Mutual company owns and operates a telephone system in and around Jonesburg, Mo., and recently filed a formal complaint with the commission asking that the Kinloch company be ordered to connect its long distance lines with the exchange of the Farmers' Mutual company.

A public hearing was heard in Montgomery City and testimony was introduced both by the complainant and the defendants. The Montgomery City Telephone Co. and the Jonesburg Telephone Co. both intervened. The testimony showed that the plaintiff was strictly a mutual company, that it was not operating its lines for profit. The evidence before the commission was to the effect that the complainant's lines are not in whole or in part used in the "conduct of affording telephone connection for hire."

The commission found that the Farmers' Mutual Telephone Co. "is not a telephone corporation" as defined in the public service commission law, and consequently the commission was without authority and could not require by order the physical connection as asked for. The case was therefore dismissed.

September 18: Hearing in the matter of adopting a uniform system of accounts for telephone companies. Every telephone company in the state has been given notice that it will be expected to be present or to be represented, and to introduce any evidence necessary to assist in the promulgating of a uniform system of accounts for telephone companies. Case 937.

September 18: General conference in which representatives of all telephone companies in the state are to meet with the commission and to introduce all testimony and evidence required in the adoption of uniform rules, regulations and practices.

NEW YORK.

August 15: The commission ordered the New York Telephone Co. to construct a pole and submarine cable line from Seaford, N. Y., across the marshes, channels and islands to High Hill Beach, to be completed before June 1, 1917. This action was taken by the commission as a result of a complaint of the bungalow colony at High Hill Beach, a community of about 500 persons, that they were wholly without telephone or telegraph facilities. The company objected to furnishing the service on account of the high initial construction cost of about $7,500 and an estimated annual carrying cost of $1,500.

OHIO.

August: The commission fixed the following valuations upon the Cleveland Telephone Co. for rate-making purposes: Reproduction value, $8,264,202; depreciation, $663,439; present value, $7,600,763.

August 11: Application filed by the Jackson County Home Telephone Co., of Jackson, Ohio, for permission to increase its capital stock $25,100, to be distributed among the stockholders in the form of a stock dividend to reimburse them for income and profits used in extensions for the company during the recent years. The company now has a capital stock of $74,100.

August 22: The commission authorized the Central District Telephone Co. and the Improved Home Telephone Co. to retain the existing physical connection between their respective telephone systems and to continue to interchange service, as provided by law. Order 917.

TENNESSEE.

August 22: Hearing on complaint made by the Southern States Independent Telephone Association against the Cumberland Telephone & Telegraph Co., alleging discrimination in rates in East Tennessee.

WEST VIRGINIA.

September 12: Hearing on the application of the four Bell telephone companies of West Virginia for a proposed consolidation. The companies include the Consolidated Telephone Co. of West Virginia, with offices in Wheeling; the Chesapeake & Potomac Telephone Co. of West Virginia; the Central District Telephone Co. and the Chesapeake & Potomac Telephone Co. of New York. These companies have 45,000 Bell stations in West Virginia. The proposed name for the merged companies is The Chesapeake & Potomac Telephone Co. of West Virginia. Protests against the merger may be filed by any subscriber or citizens of the state.

WISCONSIN.

August 18: Hearing at the village hall in Highland, Wis., in the matter of petition by George E. Sins, et al., against the New Union Telephone Co. and Farmers' Central Telephone Co., in which physical connection is asked.

Practical Subjects—Letters and Discussion

False Rings.

A certain exchange received quite a number of trouble reports of "line reversed," "other party answers," "line crossed," etc., but when the tester would make tests through the multiple or at the racks, he would find no trouble and would mark the slip "O. K. on test." The switchboard repairman noticed that there were a large number of these slips, but it did not occur to him that the trouble might be in the switchboard, neither did it seem to occur to anyone else.

Finally the repairman received a trouble slip, "don't get busy test," for a B board cord. His test showed "tip open." He supposed it was an open cord, but additional tests carried the open back to the intermediate frame, where he found a reversed jumper. This reversed the tip and ring of the cord, thus putting the busy test on the ring of the plug. As the circuit was such that its ring was supposed to be open until closed by a relay when the plug was inserted, the reversed cord gave an open tip until the plug was inserted.

Since automatic ringing and the jack per station party line system were used, the other party on the line would be rung and would answer, after which both receivers would show supervision, resulting sometimes in a new connection getting the right party. Thus reports of false rings occurred which were not obtained on test because it was the line and not the trunk circuit which was reported.

The repairman thought that he had cleared the false ring trouble entirely and watched the cords. Although the number decreased, there were still too many, and as he had tested all the other B cords, he tried to think of other causes.

Some days later, in testing the A board cords, he happened to press the ringing key of the cord on test and the supervisory light flickered, giving the appearance of a ring and sleeve cross. Testing the plug and cord showed them to be all right. An examination of the key form showed the ringing leads to be reversed.

The test was then repeated on all the A board cords and two more were found with the ringing leads reversed. The forms on all three keys did not seem to have been disturbed before. This trouble had probably been on ever since the exchange was installed, but had not been noticed, as it was not covered by routine tests and the trouble slips always reported the line instead of the cord.

Pittsburgh, Pa. Paul Shuey.

The Check Measurement and Method of Its Use.

By Pascal Bozeman.

The "check measurement" is an absolutely reliable method of locating grounds, shorts and crosses. To use it, however, the fault must be converted into a case of ground trouble. To obtain this in the case of a cross, it would be necessary to

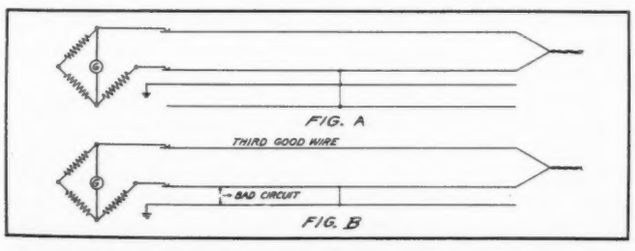


Fig. 1. Ground and Crossed Circuit Conditions.

ground one of the crossed wires at the testing station. This would put the ground on the wires at the point where they were crossed (see Fig. 1-*A*).

In the case of a short, it would be necessary to have one other good wire to measure on. This third wire would not of necessity have to be of the same gauge as that of the circuit in trouble, but it would be necessary to know its gauge and position when attached to the bridge so that when reducing the ohms to miles, the proper wire resistance would be figured. Taking the third wire and one of the wires of the circuit in trouble to measure on, first having these "shorted" at the dis-

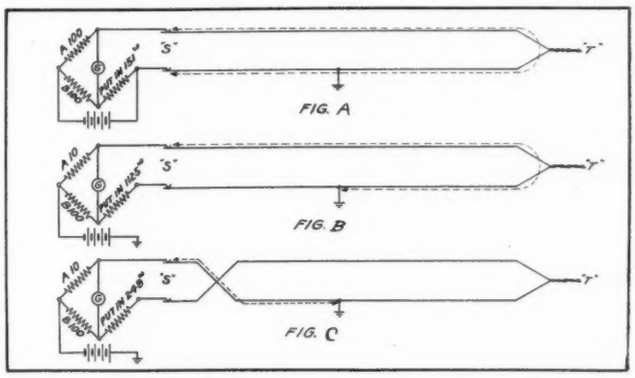


Fig. 2. Illustration of Use of Check Measurement.

tant station, the testboard man would ground the other bad wire at his station, or have the distant station ground it (see Fig. 1-*B*).

Since the trouble must be ground trouble, a case of that nature will be assumed and worked out, one side of a circuit, Fig. 2-*A*, from *S* to *T* being grounded, *S* being the testing station.

The tester at *S* has the man at *T* short the two ends of the circuit. Now, with the bridge arms even, i. e., *A*-100 and *B*-100, *S* takes a "loop" in the usual manner, and gets a reading of 151 ohms. Call this result *L* (see Fig. 2-*A*).

Leaving the short on at *T*, *S* now unbalances the bridge arms, making *A* ten and *B* one hundred (*A* is the left arm and *B* is the right arm) and grounds the bridge battery as in taking a varley. This reading is 1,125 ohms. Call this result R_1 (see Fig. 2-*B*). *S* now reverses or turns over the bridge line cords, and with battery still grounded and bridge arms the same as in Fig. 2-*B*, takes a third reading, which is 248 ohms. Call this result R_2 (see Fig. 2-*C*).

We are now ready to use the formula $(L\times B)-(R\times A)\div(A+B)=X$, where *L* equals the loop resistance; *B*, 100; *A*, 10; R_1, the first Varley reading; R_2, the second Varley reading; *X* and resistance to the fault.

Now, getting *L* from Fig. 2-*A*, and R_1 from Fig. 2-*B*, we proceed:

L times *B* equals.....15,100
minus R_1 times *A*.....11,250

equals ..... 3,850 and this divided by *A* plus *B* (110) equals 35—the answer.

Now, getting *L* from Fig. 2-*A* and R_2 from Fig. 2-*C*, we again use the formula

L times *B* equals.....15,100
minus R_2 times *A*..... 2,480

equals .....12,620 and this divided by *A* plus *B* (110) equals 114 8/11—the answer.

The resistance of one wire from the testing station, *S*, directly to the "ground" is therefore 35 ohms and 114 (leaving off the fraction) is the resistance of one wire from the testing station *S* out over the good wire to the distant station, *T*, and back to the ground over the bad wire.

To *"check"* the measurement, simply add the result of the computations using R_1 and R_2 (35 and 114) which equals 149. The sum of the two readings should equal the original loop

(Fig. 2-*A*), nearly, i. e., within two or three ohms. In this case it lacks 1 2/11 ohms of checking with the original loop resistance, 151 ohms.

To determine the resistance from the distant station, *T*, to the fault, divide the loop by 2 (151 divided by 2 equals 75.5), and from that subtract the smallest Varley reading, in this case 35. (75.5 minus 35 equals 40.5.)

In reducing the ohms to miles, only one wire must be figured. In the case we have just measured, the ground was located 35 ohms one wire from the testing station, *S*, and 40.5 ohms one wire from the distant station, *T*.

This method of toll line testing is, perhaps, a little slower than the straight loop and Varley in sleet breaks and total line failures, but the testboard man derives a certain amount of personal satisfaction from it when the lineman reports having found the trouble where it was located. Moreover, it shows immediately that there is something rotten if the sum of the two readings does not equal the original loop. If there is more than two or three ohms' difference in the "check," it is a safe bet that the figures are off, or that there is more than one case of trouble on the line.

New Building of Cumberland at Nashville.

The Cumberland Telephone & Telegraph Co. at Nashville, Tenn., has awarded the contract for construction of its new office and exchange building and work will go forward at once. The building will be of reinforced concrete construction and will cost, with switchboard equipment, approximately $300,000. It will provide ample accommodations for the office and operating force, and contain various welfare departments.

Depreciation Rates—Results.

In the June number of System was a statement concerning a merchant who sets his reserve for depreciation in a fund and thus when his autotruck was worn out, the funds were on hand to buy another with. Not discussing the subject of depreciation, it is well enough to note that the Interstate Commerce Commission's form of bookkeeping demands the deduction of the amount of the "reserve" from the property, showing the property standing minus the depreciation Thus in the case of the automobile, there is a showing of a month by month decrease in valuation until the machine is worn out But mere bookkeeping does not lay aside money to buy another one with. To do this there must be a fund. To create the fund, it may be necessary either to cut down the dividends, eliminate the waste, or raise the rates of public service corporations.

If the public service commission can state with accuracy that a telephone company needs to set aside 4½ per cent. as a reserve for depreciation in order to show that the property wears out in from 20 to 25 years, it ought to be in a position to see that there is need of that much increase in rates in order to set aside a fund to rebuild the plant at the end of the period, or against which fund the actual renewals might be charged during that period. As it stands in practice, most concerns run until their condition demands rebuilding and then issue bonds, a clear indication that the concern is *not* a *going* concern in the sense that it does take in enough money to keep itself alive without borrowing money.

Unfortunately boards of directors, managers, public service commissions and the business world, generally, have not been educated to this fact. The public is accustomed to corporations going into the hands of receivers, or issuing bonds to tide over conditions that adequate rates and a proper reserve fund would make unnecessary. This is not theory or the quibbling niceties of accounting, but plain business sense.

It is also true that some concerns will continue paying dividends on some class of stock for a period of years, the meantime selling stock as far as possible during the time, and suddenly, without adding any to the property, float a large issue of bonds to rebuild and renew with. This is common practice, but the question safely be left to the average man as to whether or it is sound business practice.

Muskegon, Mich. E. R. A[illegible]l.

"Telephony's" Home Course for Telephone Men.

(Not intended for serious study.)

By Well Clay.

A Dream of Power.

With dull stars twinkling from a leaden sky,
And a cold rough wind blustering by
At midnight, To dream that you stood alone,
Near where some mighty cataract churned to foam,
On the jagged rocks where it boiled and hissed
And wet your cheek with its flying mist.

Were you stunned with the roar of its mighty song,
As it took the plunge and hurried along;
Its roiling bosom flecked and streaked
With the foamy scars which the rocks had wreaked
In vengeance, just on the waters bold
That over their heads unceasing rolled?

Did you dream of the ages which have passed since the day
The waters first rolled down the rocks, on their way
To dwell in the sea 'til the sun and the rain,
And wind, should bring them to do it all over again?

Did you think of the races who have stood where you stand
And watched these same falls so awesome and grand;
Of the fast-changing seasons, hurrying past,
From the balmy spring morn to the wintery blast;
That tried all in vain with its ice and its cold
To fetter the fall and its power to hold?

As you dreamed you stood there, all drenched with the spray,
Did you figure all the power that was running away;
Or the might still untouched by turbine or wheel,
And wonder if Congress would allow you to steal
The falls and their power for your own private use,
To be harnessed so their energy would be turned into "juice"
For which the dear people would be privileged to pay,
While they cussed the blamed sapheads that gave it away?

Once in a while we all have touches of this ordinarily useless occupation of dreaming of some great stroke whereby we shall become rich and independent. If we could only get hold of some natural resource which feeds a public necessity we would be happy, at least we think so. And it usually ends like most pipe dreams, by fading away, because inaction breeds forgetfulness.

In the meantime, we continue to heartily condemn certain other people who have been so lucky as to have done just what we dreamed we would like to do. The fact that some other person has acquired a powerful place in the world by coming into possession of some coal mine or waterfall or something of the sort, does not make us love him a bit. On the contrary we condemn him for doing such stunts which help to enslave the people.

We are apt, too, to look about us and say, "Everything is taken." "There is no chance left for common mortals to be more than grubs to labor for the benefit of those who have been lucky," or to use the child of our thoughts "right down hoggish."

Lots of people have dreams of power, and so, also, do some large corporations. But the time is coming, we hope, when the public wealth will be turned to public use, whether it be waterfalls or manufacturing of public utility goods, without so much cream being skimmed off in the process.

No one has the divine right of unlimited, unregulated monopoly, and some day there will be a new adjustment which will prevent unhealthy combinations of manufacturing merchandise and operating utilities from being carried on by one

and the same corporation. Some combinations are hard to digest in business as well as in the human system. If wise counsel and solemn promises do not avail, then, as in the case of children, other tactics must be used.

Then again, the corporation that dreams of unlimited power, unfettered and uncurbed, is not the only one that is laboring under a mistaken idea. If you think all the power that nature gave the country has been either given away by Congress or is about to be, you are as much mistaken as the other fellow. There is power unlimited in the massing of any forces and Independent telephone men have within their ranks the means of working out either their prosperity or their ruin.

The power of the falls would be of as little use to a person as it has been to the people of the ages past that have watched it run away unchecked, unless he knew how to use its energy. Therefore, power is not a gift of the powers of the nation, but of the power that created the power.

First, we must "wake up" and not dream all the while, and second, we must learn that the way to utilize power is to harness it.

Who will harness the latent forces of the Independent telephone field so that the now unused power may be used for the common good of all concerned? Whom must we "wake up" first, the little private in the rear rural ranks or the big fellows up in front?

Do we need an evangelist or a general, a merchant or a mechanic? We must at least establish advanced bases if we would advance further, and in this case this means more pay for the services we are selling. Who can get all the wheels to work in harmony?

APHORISM: Dreams of power generally end in a power of dreams.

Additional Collection Suggestions.

In TELEPHONY of August 5, S. H. Shutt presents a very good system of collection methods which would certainly help in that ever-present game of getting the money. I have just one addition which I have tried out with good results. When a man pays by check, why not see him and present a slip similar to the enclosed, authorizing his bank to handle the regular monthly rental bill as they would one of his checks? It is explained that should any errors arise, they may be rectified as freely and

[redacted] TELEPHONE COMPANY

EXCHANGE SERVICE CONTRACT

The undersigned Subscriber hereby requests the [redacted] Telephone Company to furnish, install, and maintain a telephone at ....., to connect this telephone by a ____ party line with its local central office and to furnish in connection therewith _____ Exchange telephone service for a period of ____ year ____ and thereafter until this contract is terminated by thirty (30) days' written notice from either party to the other. For this service the Subscriber agrees to pay to the Company, monthly in advance at the Company's office, the sum of $_____.

The Subscriber agrees to pay the Company at its established rates for all supplemental service or equipment which the Company may furnish upon his written or verbal order.

The Subscriber further agrees to pay monthly, at the Company's established rates, for all Toll and Long Distance service received.

The Rules and Regulations of the Company governing the furnishing of service, which are filed with and approved by the Railway Commission, are hereby made a part of this contract.

Accepted _____ 191__ Dated _____ 191__

[redacted] TELEPHONE COMPANY

Subscriber's Signature,

By _____ Commercial Manager

TAKEN BY

A discount of ____ cents from the monthly rental charge will be allowed if the rental is paid on or before the _____ of the month in which it is due.

An Effective Form of Contract Blank.

cheerfully as though they were collected from the subscriber personally.

Our bankers do not object to handling bills for their regular customers in this way. It makes it unnecessary for the subscriber to come to the office, pay postage on his check, or be bothered by the collector. It helps us for, on the first of the month, all that is necessary is to take the bill to the bank and get our cash. No delay, no hunting for the subscriber, and no trouble of any kind.

One other help in the collection game is utilized before the collections start, when making a contract with the subscriber. Our company has a very simple contract form on one side of a 4-in. by 6-in. card, on the reverse side of which we keep our commercial office record of each subscriber. We always aim

_____ 19__

CASHIER,

_____ BANK,

You are hereby authorized, until such time as I may cancel this arrangement, to pay to the _____ COMPANY the amount of my telephone bill each month as it becomes due, and the receipted bill of that company will be sufficient check against my account. It is understood that in case of billing error, adjustment will be made between the Telephone Company and myself.

_____ DEPOSITOR.

Blank for Authorizing Bank to Handle Subscriber's Rental.

to take a contract before installing a telephone and, before having the contract signed, explain at some length how we want it paid and, what is of more importance possibly, why we want advance payments at the office.

If you say: "Mr. Smith, I know you need a telephone and I want to furnish you one, but there are a few things I want to explain to you first. One of these is in regard to payment. We want our money each month in advance. We know you are good for many times the amount of this monthly bill, but we cannot enforce the advance payment rule on those who are poor pay unless we do on all.

Again, by collecting in advance from everybody we are doing you a distinct favor. We are enabled to make better rates where we have no losses than we would if we let the bills run. When losses and collection expenses are high, it must necessarily follow that rates will have to be high."

Some talk along this line, and the signature to a contract providing that "the subscriber promises to pay monthly in advance at the company's office the sum of $——," will put them in a proper frame of mind to start with, and make collections easier all the time. Manager.

Those Batteries.

Until recently, I had come to believe that while engaged in the duties of trouble shooter on rural lines I had listened to every conceivable explanation as to why the aggrieved subscribers' telephones failed to work.

I have been told that the batteries must be weak because the subscriber failed to hear his neighbors and have been assured that the batteries must be strong because the subscriber could hear his neighbor perfectly. Then, again, the bells did not ring "one bit better" after I had replaced the batteries.

Repeatedly, after changing batteries in the telephone and ringing Central for a test, I have heard the farmer's wife exclaim, "Ah! What a different ring it gives the bell!"

In one locality there exists a deep-seated, unshakeable belief that the subscribers whose batteries were weak, stole current from those whose batteries were strong. I once heard an irate farmer vow that the next time he was unable to ring Central, he would get the batteries from his engine, hook them up to the telephone and would see to it that he "got Central or else burned out the darned old telephone."

But a few days ago I unearthed a new one. A farmer declared that for an entire week the subscribers on his line were unable either to ring Central or to ring each other, due to the fact, as he explained it, that "Farmer Smith and Farmer Brown were grinding the line with dead batteries." As soon as Smith and Brown went to town for new batteries, the bells resumed their accustomed ring and have been ringing ever since.

If the farmer's telephone does not work, it's the batteries.

Traer, Iowa. E. G. Gillard.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Part IV, Telephone Finance, by J. C. Kelsey and S. R. Edwards, Completed June 3, 1916—Installments Now Being Presented Comprise Part V, Telephone Advertising and Publicity, Written by Roy D. Mock

Quiz Questions on the Preceding Installment.

50. What kind of an appeal makes an advertisement more effective? Give some illustrations of this kind of an appeal.

51. From a practical advertising standpoint, how may the direct application of the association of ideas be stated? Illustrate.

52. How can suggestion be used to advantage in telephone advertising?

53. What is one of the strongest ways to suggest things to people? Illustrate.

CHAPTER V. Practical Advertising Psychology (Cont'd).

54. *Fusion of Ideas in Advertising.*—One subject of vital importance in the handling of advertising is known as fusion. Just as an honest man loses his reputation by being seen with dishonest men, so an advertisement can lose its reputation by being seen with advertisements of a questionable character. It is an old saying that birds of a feather flock together, and this

Are You One of the Losers?
WON HIGHEST AWARD
Low Corn King
Low Cloverleaf
SOMETIMES Americans wonder why they get only about half the crop yields from an acre that are produced in other countries. Well, here's one reason—a large majority of the farmers in this country own no manure spreader. One corn belt state lost $30,000,000 last year by the wasting and poor handling of manure. Are you one of the farmers who shared in this loss? If you are, you need an IHC manure spreader.
International Harvester spreaders, Low Corn King and Low Cloverleaf—besides being low, strong, durable, simple in beater and apron mechanism, with good traction, light draft, and plenty of clearance—have a really successful wide-spreading device.
Low Corn King and Low Cloverleaf spreaders are low for easy loading and narrow for easy handling in yard, stable or field. From a box 40 inches wide either of these spreaders covers an even strip of ground 8 feet wide, or better. It saves time and labor, and keeps wheels and horses well away from the slippery manure already spread.
See the IHC dealer about a Low Corn King or Low Cloverleaf made to stand by you for years. Write us for catalogue.
International Harvester Company of America
(Incorporated)
CHICAGO USA
Champion Deering McCormick Milwaukee Osborne Plano

Figs. 44 and 45. Negative Thought in Headings, Positive in Text.

saying can be twisted around very readily to apply to advertising.

If your perfectly good telephone advertisement were surrounded by death notices and advertisements of fake jewelry, it would suffer quite materially on account of its unfortunate position in the newspaper. The reason is quite apparent, since the subject of death is not a pleasant one, and the fake jewelry advertisements would make one suspect fraud at once. Both of these associations of unpleasantness and suspicion would be carried over in the mind of the reader when he began reading the telephone advertisement, and its statements would be accordingly discounted.

Many of those who choose illustrations and headings for

The Home Telephone Co. is Not Wall-Street Controlled

It is not subject to outside control of any kind, either financial or operating. None of its directors or officers lives elsewhere, nor do they consider the Home Telephone Co. merely as a means of making money.

Consequently, the service of the Home Telephone Co. will not be found tempered by a desire to earn dividends for outside capitalists at the expense of its subscribers. It is not simply a link in a big chain of telephone companies, nor merely an extension of a big system.

Just ask the family with a Home Telephone what complaints they have to make about the service.

Home Telephone Co.

R. Colton Brown, Secretary & Manager

Fig. 46. Example of a Negative Telephone Advertisement.

advertisements seem to lose sight of this idea of fusion. They select a heading or an illustration which tells what the product *is not*, and then devote the rest of the advertisement to explaining what the product *is*. Unfortunately, the minds of most of us do not operate so quickly that we can throw off the effect of such a negative thought. Even though the advertisement be read entirely through, there is a fusion of the negative thought expressed in the heading or illustration, with the positive thought expressed in the text matter, and the result is far from that desired.

55. *Examples of Lack of Fusion.*—An advertisement put out by one of the largest concerns in the world is shown in Fig.

44. This company desires to convince farmers that they should use one of these spreaders and that they are losing money unless they do. The main heading says: "Are You One of the Losers?" and this is immediately followed by a picture of the company's spreader. The natural assumption would be that if you had purchased one of these spreaders, you were, indeed, one of the losers, which is exactly the opposite of the idea the company intended to convey.

In Fig. 45 is illustrated another advertisement gone wrong because of an erroneous idea of the subject of fusion. This advertiser desires to tell people that a light weight motor cannot be used for plowing as such heavy work demands a heavy motor. You will get this idea if you read clear through the advertisement.

Since larger type is easier to read than small type, however, a hurried glance through the advertisement will tell this story: "You can't plow—Oil-Gas Tractor." This leads one to believe that the "Oil-Gas Tractor" is not suitable for plowing purposes, and that is the exact contrary to what is intended to be conveyed.

56. *A Positive Advertisement Stronger than a Negative.*—

The Home Telephone Co. is a Smithville Institution

It is financed by local capital and is operated by men living right here in Smithville. Every director and every officer of the Company gives freely of his time and talents to help build up an institution of which Smithville can be proud.

Consequently you will find the service of the Home Telephone Co. loyal and unusually responsive to your needs. The Company was organized to serve this community and this community alone. Its whole business purpose is built around the one idea of "Local Telephone Service for Local People."

Just ask the family with a Home Telephone how they like it.

Home Telephone Co.

R. Colton Brown, Secretary & Manager

Fig. 47. Same Ideas of Fig. 46 Expressed in Positive Form.

It has been pretty well demonstrated that a positive advertisement is much stronger in its appeal than a negative advertisement. By a positive advertisement is meant one which devotes itself to telling what an article is rather than what the article is not, while a negative advertisement is the opposite. The illustrations in Figs. 46 and 47 will make apparent this difference between positive and negative appeals.

In Fig. 46 an attempt is made to point out what an Independent telephone company is not. The result is that the mind finds it difficult to steer a straight course through such a sea of negatives and finally gets into a confused condition. Fig. 47 on the other hand, presents these same ideas in a positive form, each statement of which presents some additional fact which the mind can easily grasp.

In actual tests it has been proved that the positive form of statement is much stronger than the negative. And it is consequently always safest to write every advertisement with the positive thought in mind. Direct commands can also be stated

ASK FOR and GET
HORLICK'S
THE ORIGINAL
MALTED MILK
Cheap substitutes cost YOU same price

Fig. 48. No Specific Appeal in This Advertisement.

in either a positive or a negative way. "Don't leave the receiver off the hook," is a negative command. "Put the receiver back on the hook," is positive and will be found much stronger.

57. *Definite Story Should be Told in a Telephone Advertisement.*—Above all things, in writing a telephone advertisement, be sure that it tells a definite story about the company which is paying the bills. It may sound strange, but nevertheless it is true that a great deal of advertising put out really advertises nothing at all. By this we mean that the story told is not distinctive and does not apply exclusively to the one product. A few examples will make this point clear. The advertisement shown in Fig. 48 has been run in a great

ASK FOR and GET
HORLICK'S
THE ORIGINAL
MALTED PRUNES
Cheap substitutes cost YOU same price

Fig. 49. By Changing One Word Fig. 48 Can be Made to Advertise Almost Any Produce.

many magazines and newspapers. Fig. 49 shows how this same advertisement, with the change of one word, could be made to advertise almost any product under the sun.

Obviously in such an advertisement as this, there is very little relationship between the article itself and what is said about it in the advertisement. Undoubtedly there are many original things that could be said about this particular brand of malted milk which could not be applied to any other product—nor even to any other brand of malted milk. How much better it would be to tell the public what some of these points are. *(To be Continued.)*

Ohio State Exhibit at State Fair.

One of the exhibits booked for the Columbus building at the Ohio state fair is that of the Ohio State Telephone Co. A 50-line automatic switchboard is to be installed and telephones stationed at intervals throughout the building. Those attending the fair will not only have an opportunity of witnessing the automatic system in operation, but still be permitted to use any of the lines for communicating with different parts of the building or making local city calls. Long distance connections may also be obtained, at the usual rates.

Personal Items of Interest to the Operating Field

ROBERT L. SWANSON, owner and manager of the R. L. Swanson Telephone & Telegraph Co., is a native of California, where he was born in 1881. When he was but three years of age his parents moved to Red Bluff, California, in which vicinity he has been located ever since that time.

R. L. Swanson.

In 1903 he conceived the idea of building a rural telephone system to settlements at the eastern end of Tehama county. The following year he secured a 50-year franchise and built about 55 miles of single wire line which accommodated 58 subscribers. Since that time Mr. Swanson has made many improvements to his system. He now operates all metallic circuits and three rural switching stations with a total of 88 patrons, despite the fact that the Pacific Telephone & Telegraph Co. has paralleled his lines and tried every possible method of driving him from the field.

During the period from 1904 to 1908 his system was operated in connection with the exchange of the Pacific company at Red Bluff. Upon the formation of an Independent company in Red Bluff, however, Mr. Swanson assisted that company in its efforts to give good service to all patrons instead of the very poor service said to have been given by the Bell company.

As the affairs of the New Independent company at Red Bluff were poorly managed, no dividends were ever received by the stockholders. Becoming dissatisfied, they succeeded in getting the Pacific company to form a new company to take over the systems of both the Independent and Bell companies in Tehama and Glenn counties. The sanction to the consolidation under the name of the Sacramento Valley Telephone Co. was given by the California Railroad Commission in July, 1915.

Mr. Swanson was left to continue the fight alone, and he is having a difficult time of it.

R. L. STEWART, president of the Consolidated Telephone & Telegraph Co., Thomasville, Ga., called at TELEPHONY'S offices last week.

WALTER J. GALLON, general manager of the Citizens Telephone Exchange, Sheboygan, Wis., was a visitor at TELEPHONY'S offices early last week.

FRANK LYLE, of Louisville, Ky., has assumed charge as local manager of the Mayfield (Ky.) office of the Central Home Telephone & Telegraph Co. Mr. Lyle succeeds C. Emerson.

W. B. FISHER, commercial manager of the Louisville (Ky.) Home Telephone Co., outgoing president of the City Salesman's Club of Louisville, has been chosen chairman of the Boosters' Committee of the organization. In that capacity he will have charge of the campaign to double the membership which is to be instituted shortly.

R. A. LUNDQUIST, consulting engineer of Minneapolis, Minn., has been selected by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., to study the markets for electrical goods in China, India, Australia, South Africa, and a number of other countries in the Far East.

There was a time when American electrical goods met with considerable competition in the Far East, but the war has greatly handicapped the principal European competitors, and American manufacturers are making a serious effort to take advantage of the situation and get permanent possession of the markets. A great deal of preliminary study is still needed, and Special Agent Lundquist's part in the campaign will be to ascertain the types, qualities and costs of electrical apparatus with which American goods come into competition, as well as to look into the general opportunities for the sale of such goods.

Before leaving on the trip the special agent will spend some weeks in the principal business and manufacturing centers conferring with manufacturers, exporters and business houses on the scope of the investigation.

From Factory and Salesroom

Conventions: Indiana Independent Telephone Association, Indianapolis, September 14-15; United States Independent Telephone Association, Chicago, December 5-8

Central Energy Equipment to be Installed at Delphi, Ind.

The Carroll Telephone Co. recently awarded a contract to the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., for a complete central office equipment for its main exchange in the city of Delphi, Ind. The equipment is now in the course of construction and will be installed complete in the central office building on or before November 15.

The contract covers a central energy, lamp signal, multiple switchboard of the double relay type, a main distributing frame, relay rack and miscellaneous cable racks; also the necessary power and battery equipment required for the operation of the main board.

The new switchboard will consist of three single position operator's sections and a cable turning section. The first position will be used for toll and rural lines and the second and third position for regular local lines. With the multiple jacks arranged in two consecutive positions this switchboard will have an ultimate capacity for 1,200 lines. The present equipment will provide switching facilities for 500 local and 35 toll and rural lines. No answering jacks will be provided, as a line lamp is associated with each multiple jack, all calls to be answered by means of the multiple jacks.

Among the more interesting features of this installation are the automatic circuit modifications of the connection cord pair equipments which, it is said, will provide for more accurate and speedier service than is possible with the ordinary equipment of a multiple switchboard. It is unnecessary for the operator to manipulate the listening key when answering a call, as the insertion of the answering plug in the multiple jack of the calling line automatically switches the operator's set to the cord circuit used. In a like manner the insertion of the calling plug in the multiple jack of the line wanted, disconnects the operator from that cord circuit.

After establishing the connection, the operator sets the ringing key for the proper ringing condition and the automatic ringing system rings the bell at the called telephone until an answer is obtained or the calling subscriber "hangs up" and abandons the call. This feature is of great advantage

in that the operator is not obliged to give the call further attention and it enables her to answer more calls per hour during the busier portions of the day.

In the event that a subscriber desires to re-call immediately after signaling for a disconnection, it is only necessary to move the hookswitch lever up and down once. This action establishes an intermittent flashing signal on the supervisory lamp associated with the answering cord used, which persists until the operator answers by pressing her re-call key.

Paragraphs.

THE BATES EXPANDED STEEL TRUSS CO., 208 So. La Salle street, Chicago, has issued a booklet entitled "Bates Steel Pole Treatise," descriptive and illustrative of its one-piece steel poles for telephone, telegraph, transmission lines, etc. The booklet also contains some simplified mathematical formulas for calculating various stresses common to pole line design, construction and installation. A copy of this booklet will be sent promptly by the Bates company to any person or company interested in steel poles, upon request.

Phoney Bill Comments on Purchase of Garford Business.

"The purchase of the telephone assets and telephone business of the Garford Mfg. Co.," Phoney Bill says, "makes the Stromberg-Carlson Telephone Mfg. Co. a bigger, stronger and more permanent asset to the Independent telephone industry than the two separate companies were before."

As may be seen from the accompanying reproduction of the illustration appearing on the August blotter calendar of the Stromberg-Carlson company, Phoney Bill makes it his business to see that the Stromberg-Carlson banner, upon which is prominently displayed the familiar Independent shield, is placed on the flag staff high above the company's factory in Rochester, N. Y.

This blotter, containing the calendar of the current month as well as that of the preceding and following months, is published monthly by the Stromberg-Carlson company and is mailed to a large list of Independent tele-

Hoisting the Stromberg-Carlson Banner Above Its Factory.

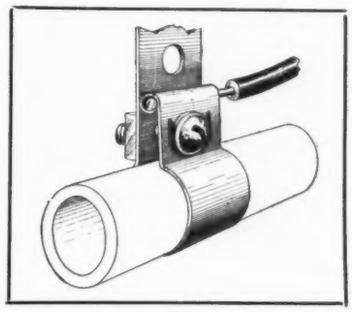
phone men. The company will be glad to add to that list the name of any other person or company that may be interested in receiving it regularly.

Fan Business Causes Peak in Telephone Load.

Under ordinary conditions the 22-section switchboard in the Commonwealth Edison Co.'s private branch exchange at Chicago undergoes two peak loads annually. These occur about May 1 and October 1, the moving days, when the apartment and house leases of most of the city's population expire. This year a third peak occurred when, during the last days of July, the excessive heat caused an unprecedented demand for electric fans. During the period from June 26 to July 29, 1,646 fans were sold, 1,037 of them on July 27, 28 and 29. In the placing of these orders the telephone played an important part.

An Improved Ground Clamp.

An improved ground clamp which is said to combine the efficiency of the high-priced clamps and the simplicity of the cheaper ones at a moderate cost has been placed upon the market by the H. B. Sherman Mfg. Co., of Battle Creek, Mich. The Sherman ground clamp is claimed to have a number of exclusive features of advantage, not contained in any other clamp.



The Sherman Ground Clamp.

It is said to be the only all-copper, one-piece clamp that can be drawn up absolutely tight. The roll portion for soldering, as shown in the accompanying illustration, is turned in to rest against the opposite tongue of the clamp when in position, preventing the two ends from tipping together when tightened, holding the ears parallel, and insuring the largest amount of drawing power. The band is half formed, making it easy to wrap around the cable.

The bolt head rests in a deep countersink placed at just the right angle, with the result that, it is claimed, the most tremendous pressure will not make the bolt tear through the soft copper. A brass washer further prevents the bolt head from cutting into the copper.

The countersink and washer also form a clever device for holding the wire when solderless connection is desired. The wire being wrapped around the bolt shank, lies inside the countersink under the washer and a sidewise jerk cannot loosen it. This feature is said to make the clamp especially desirable for telephone work. This is the only ground clamp, the manufacturer claims, that can be used for both soldered and solderless connections with no change, thus making it unnecessary to carry a stock of two different kinds of clamps.

The Sherman ground clamp is made of flexible sheet copper, with a stout bolt heavily coppered to prevent corrosion and a brass washer. The terminal end of the clamps is heavily tinned, ready for soldering. There is no slot through which the band must be pulled, giving no chance for the soft copper to become kinked or twisted. The Sherman ground clamps are adjustable and the three sizes made cover all requirements. Further information may be obtained upon application to the company.

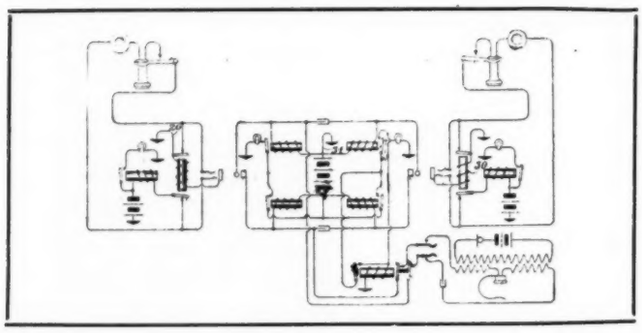
Meeting of Benton County Independent Association.

The meeting of the Benton County Independent Telephone Association, held August 17 at Lafayette, Ind., was well attended. O. M. Leich, general manager of the Cracraft, Leich Electric Co., Genoa, Ill., gave an interesting talk on magneto equipment, which was very much appreciated by the telephone men present, practically all of whom owned or operated magneto plants.

Several others of the manufacturers were to have addressed the meeting but because of the fact that the time was growing short and it was planned to entertain those present at a baseball game in the afternoon, they were requested to postpone their remarks until the next meeting.

Record of Telephone Patents Recently Issued

1,192,007. July 25, 1916. TELEPHONE SYSTEM; F. M. Slough, Elyria, Ohio; assigned to Garford Mfg. Co. The feature of this system is provision for automatic connection of the operator's set. A calling sleeve supervisory relay is located in the cord circuit and operates for connecting the operator's set to the circuit, in connection with means under control of the called



No. 1,192,007.

subscriber. This control is automatically removed after the called party has answered.

1,192,064. July 25, 1916. SELECTIVE SIGNALING SYSTEM; J. A. Hulit, Chicago; assigned to Automatic Electric Co. The feature of this system is the operation of the selectors connected to the circuit. Each selector contains an operating and a release magnet. Impulses of either polarity operate the operating magnets to advance the selector, while an impulse of but one polarity operates the release magnets to release the selectors. Selective means determine which selectors are advanced and which released.

1,192,165. July 25, 1916. CALL DISTRIBUTING SYSTEM; H. P. Clausen, Mt. Vernon, N. Y.; assigned to Western Electric Co. Automatic switching means are permanently associated with the telephone lines while connecting plugs are permanently associated with the switching means. Automatic distributing means are associated with a plurality of the automatic switching equipment and auxiliary connecting plugs are also connected with the distributing means. The auxiliary plugs are prevented from being automatically associated with one of the lines when an unanswered call is associated with one of the connecting plugs. By means of the selecting and distributing switches a desired percentage of the telephone traffic originating in a group of subscribers' lines, is associated with the auxiliary connecting plugs. The connecting plugs directly associated with the selecting switches, are used for traffic in excess of the desired percentage.

1,192,166. July 25, 1916. DIFFERENTIAL MICROPHONE REPEATER; J. J. Comer, Chicago; assigned to Automatic Enunciator Co., Chicago. A lever is connected to a resilient diaphragm of the microphone transmitter of this telephone amplifier. Provision is made for changing the leverage and pivoting means so as to mechanically regulate the tension of the diaphragm and the air gap between an electromagnet and armature which operate the lever.

1,192,175. July 25, 1916. SELECTOR SWITCH; A. H. Dyson, Montclair, N. J. In this automatic telephone switch a plurality of brush sets is mounted upon a longitudinally movable shaft. For each brush a series of stationary contacts is provided. Normally the brushes are maintained in an inoperative position at one side of their rows of contacts. A brush-tripping mechanism when operated permits a desired brush to assume its operative position.

1,192,835. July 25, 1916. ELECTRIC LINE APPARATUS PROTECTOR; P. K. Higgins, Liberty, Mo.; assigned to F. R. Parker, Chicago. The feature of this protector is a heat cartridge having a carbonaceous resistance heater encased within a conductor. Metallic ends are secured to the cartridge by a fusible substance. Springs are connected with the metallic end having tension tending to pull the ends away from the core. There is an insulating substance between the ends of the cartridge and the metallic ends and provision is made for connecting the cartridge to the ground. The springs are under control of the heating element of the cartridge.

1,192,975. August 1, 1916. TELEPHONE SET; C. S. Baker, Philadelphia, Pa. In this telephone desk stand the receiver hook is pivoted upon an insulating plate mounted in the hollow standard. One resilient and one fixed contact member are supported by the plate. A rod connected with the receiver hook extends through an insulating block secured to the plate, the rod being movable longitudinally in the block and in the hollow standard. Means carried by the lower end of the rod are adapted to co-operate with the resilient contact member to alternately make and break the contact between the members upon the movement of the hook.

1,192,993. August 1, 1916. AUTOMATIC TELEPHONE AND RESPONDING APPARATUS; F. J. Cressey. A telephone and phonographic sound transmitting apparatus is described. A telephone transmitter, wired to the telephone circuit, has a reproducing pin in contact with a record of a phonograph. The closing of the signal circuit in the telephone circuit closes the circuit of an electric motor which operates to impart movement to the phonograph. Provision is made whereby a plurality of like phonographic responses are transmitted through the telephone talking circuit from the phonographic transmitter during the closure of the motor circuit.

1,193,053. August 1, 1916. MACHINE TELEPHONE SYSTEM; L. Polinkowsky, Brussels, Belgium; assigned to Western Electric Co. In this automatic system sequence switches, movable in only one direction, control the automatic connection switches, and also the operating circuit of a meter associated with the calling line. One of the sequence switches is adapted to close at one of its contacts, the meter operating circuit, when moved upon the initiation of restoration. The other sequence switch is adapted to open at one of its contacts the meter operating circuit when moved upon the initiation of restoration.

1,193,137. August 1, 1916. CALL REGISTERING SYSTEM FOR AUTOMATIC TELEPHONE SYSTEMS; C. L. Goodrum, New York; assigned to Western Electric Co. In this system multiple test contacts for the lines are provided in the automatic finder switches. Meters are connected with these test contacts and each provided with an operating winding of low resistance. A test circuit associated with each of the finder switches includes a test relay of relatively high resistance. Means operated upon the response of the called party close the operating circuit of the meter magnet to actuate a calling line meter.

1,193,160. August 1, 1916. AUTOMATIC TELEPHONE TRUNKING SYSTEM; W. E. Lamb, Chicago; assigned to Automatic Electric Co. The trunk lines for talking purposes extend from a non-numerical trunking switch, the operation of which is controlled by a slow-acting line relay. Means controlled by a cut-off relay open the circuit of the line relay which, however, is provided with means under its control for controlling the extent of operation of the cut off relay.

1,193,169. August 1, 1916. MEASURED SERVICE TELEPHONE SYSTEM; T. G. Martin, Chicago; assigned to Automatic Electric Co. A meter is provided for the calling lines in this automatic telephone system. Current of normal strength to operate the automatic connecting switches is supplied as is also talking current to the line. Provision is made for reducing the current for operating purposes, when connection between two lines is established, and for returning it to normal upon the response of the called subscriber. The reduction and the increase in the strength of the current are utilized to operate the meter. There are 30 claims to this patent.

1,193,179. August 1, 1916. TELEPHONE CALL REGISTER AND SYSTEM; G. E. Mueller, Aurora, Ill.; assigned to Kellogg Switchboard & Supply Co. Selective switches are automatically operated to select the calling line and a flow of current over a contact wiper of a selective switch operates an electromagnet of a call register individual to each calling line. Mechanism controlled by the electromagnet records a call on the register. Provision is made to prevent the recording of a call unless a response is secured. There are 46 claims to this patent.

1,193,184. August 1, 1916. TELEPHONE TRANSMITTER; A. Plecher, Florinda, Fla. One of the electrodes of this transmitter is in the form of a membrane covered by a conductive film. The other electrode is shaped to provide numerous points for contact with a film, the contact points being in fixed relation one to the other.

1,193,206. August 1, 1916. THERMIONIC AMPLIFIER AND RECTIFIER; H. J. van der Bijl, New York; assigned to Western Electric Co. In this thermionic amplifier of the audion type, mica strips are threaded into a grid and a filament threaded through them so that it is supported by and brought into close proximity to the grid but insulated therefrom.

1,193,339. August 1, 1916. ELECTRIC SWITCH; F. B. Cook, Chicago; assigned to F. B. Cook Co. A spring jack structure is described. A mounting strip of insulation has a plurality of plug-receiving openings at its forward portion and is provided with openings therethrough lo-

cated along the strip. Contact springs, supported by the mounting strip, are held in place by a fastening strip of insulation.

1,193,458. August 1, 1916. MEASURED SERVICE TELEPHONE SYSTEM; E. D. Fales, Chicago; assigned to First Trust & Savings Bank, Chicago. In this automatic system, call registering devices allotted to the different lines, are resonsive to the called subscribers for the registration of calls. Common battery means operate the devices and supply talking current to the lines. The closure of any called line operates the registering device of the calling line to register the call. Each registering device is provided with but a single pair of relay windings for feeding talking current to the called line.

1, 193,590. August 8, 1916. TELEPHONE DIRECTORY; C. E. Napp, Los Angeles, Cal. This directory comprises a base plate adapted to support a memorandum pad, which has an index-supporting plate formed integral with it and adapted to support a set of index cards. Index fingers are formed upon the index-supporting plate in such a manner to extend through the set of cards so as to hold the cards on the plate.

1,193,678. August 8, 1916. ELECTROMAGNET; F. F. Fowle, Chicago. In this electromagnetic relay an inclosed cylindrical electromagnet is mounted upon a base and longitudinally adjustable with respect thereto. One edge of the inclosing annular shell of the electromagnet constitutes one of the pole faces of the magnet. The other pole face is formed from the outer side of an enlarged disk of the central concentric core of the electromagnet. The winding is located between the core and the annular shell. A thin disk of magnetic material is mounted upon a frame pivotally supported by the base, adjacent to the pole pieces and of a size to at least overlap the edge of the annular shell so that a nearly closed magnetic circuit is formed. A spring is provided for normally withdrawing the frame and the armature from the pole faces.

1,193,835. August 8, 1916. DISPATCHER'S TELEPHONE SYS- Louis, Mo.; assigned to W. N. Matthews & Brother. An anchor-sinking device is the feature of this guy anchor. The device comprises a tubular member adapted to enclose the anchor rod. The lower end of this member is threaded for engagement with the threaded shank on the anchor body so that the anchor and the sinking device may be locked to each other against relative longitudinal movement.

1,193,835. August 8, 1916. DISPATCHER'S TELEPHONE SYSTEM; C. A. Simpson, Chicago; assigned to Kellogg Switchboard & Supply Co. A relay having only one winding is provided at each substation and is energized through means controlled by the dispatcher. A call bell at each station is actuated responsive to the energization of the relay. A locking circuit, local to each station, is provided for holding the signal relay energized. The dispatcher may de-energize the relay so as to render the call bell ineffective.

1,194,142. August 8, 1916. SYSTEM FOR TELEGRAPHIC AND TELEPHONIC COMMUNICATION; J. H. Claus, West Philadelphia, Pa. In this system a conductor is permanently connected with a continuous current means which continuously electrically charges the conductor. A coil of excessively high inductance is in series with the charging means. Provision is made for generating continuously alternating electric currents in the conductor which are interrupted to form signals.

1,194,274. August 8, 1916. TRANSMITTER FOR SIGNALING BY ELECTROMAGNETIC WAVES; F. J. Chambers, London, England; assigned to Automatic Telephone Mfg. Co., Liverpool, England. A transmitter for transmitting wireless signals is described.

1,194,280. August 8, 1916. TELEPHONY; P. B. Delany, South Orange, N. J. A transcribing device is located at the receiving station and mechanically connected with the transmitter at the receiving station so that messages received from the sending station may be transcribed at the receiving station and telephonic impulses corresponding in general characteristics with the impulses received from the sending station, may be sent back over the line to the sending station.

1,194,339. August 8, 1916. TELEPHONE EXCHANGE SYSTEM; T. G. Martin, Chicago; assigned to First Trust & Savings Bank. The feature of this automatic system is the provision of a connector for connecting the calling line with the called line, the connector being adapted to distinguish between busy and non-busy lines. It is provided with a three-position side switch, a private wiper and a busy signal circuit for the calling subscriber's line. A ringing generator is common to all subscribers and a ringer relay individual to the connector is controlled by a circuit interrupter. The busy signal circuit, established when the connector attempts to connect the calling line with the called line while the side switch is in second position, is closed each time that the interrupter energizes the ringer relay. There are 123 claims to this patent.

1,194,367. August 15, 1916. AUTOMATIC TELEPHONE EXCHANGE SYSTEM; B. G. Dunham, Hawthorne, N. J.; assigned to Western Electric Co. The feature of this automatic system is the provision of a circuit for energizing the primary magnet and a control relay simultaneously. Another circuit maintains the energization of the control relay while a stepping circuit, including an armature and front contact of the control relay, continues the operation of the primary magnet. A stepping circuit of a secondary magnet includes an armature and back contact of the control relay.

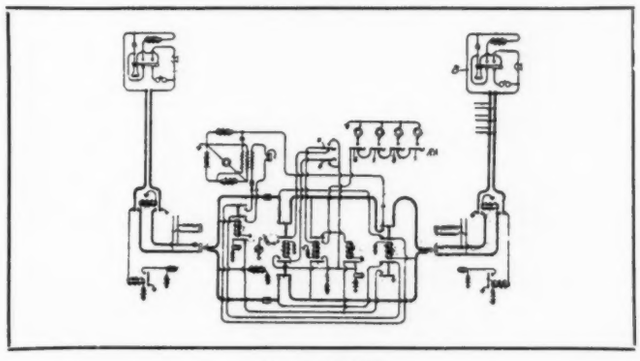
1,194,457. August 15, 1916. TELEPHONE RECEIVER; B. D. Willis, Chicago; assigned to Automatic Electric Co. The electromagnetic circuit of this receiver includes the diaphragm and the core of the electromagnet. The core and diaphragm are so constructed and proportioned and the coil so wound that the inductance of the receiver is greater with a current strength below 0.1 ampere and less with a greater current flow.

1,194,690. August 15, 1916. TELEPHONE AND TELEGRAPH POLE CONSTRUCTION; H. E. Adams, Pittsburgh, Pa. This construction consist of a metallic sheathing which slips over the usual wooden cross arm. The sheathing is secure against endwise movement to the cross arm. There are laterally extending flanges along the edges of the sheathing upon which are slidable plates through which the insulating elements extend to contact with the cross arm.

1,194,741. August 15, 1916. AUTOMATIC TELEPHONE SYSTEM; H. H. Ide, Chicago; assigned to Kellogg Switchboard & Supply Co. In this system a plurality of switches is adapted to be set up in a series to establish a connection. Mechanism under control of the calling subscriber's line sets the switches to complete a connection to a called line, while means controlled at the calling station are operable after response of a called connected station to release the connection of the calling station from the called station independently of the connected called station. The last-mentioned means include a circuit controlling element adapted to be rapidly moved from one position to its alternative position and back again to thereby momentarily release the holding circuit for the other switches of the series. By its second movement, the ground connection to the terminal of the holding circuit is restored. A relay operates the circuit controlling elements while a second relay, controlled directly by the called line, has means to effect the rapid dual action of the first relay.

1,194,765. August 15, 1916. TELEPHONE RECEIVER; D. P. Moore, Washington, D. C. The feature of this receiver is a lever which has one end operably connected to the diaphragm and a fixed pivot for its other end. Manually operable means are provided for moving a coil under the influence of the permanent magnet, to vary the air gap between the pole of the coil and an armature operably connected to the lever. A second manually operable means is also provided for moving the coil to vary the position of its pole relative to the fulcrum of the armature.

1,195,163. August 15, 1916. CONVERTIBLE RINGING CONTROL FOR TELEPHONE SYSTEMS; G. D. Wolf, Chicago; assigned to Kellogg Switchboard & Supply Co. In this system associated relays are provided so that when a key is operated an automatic intermittent application of ringing current to a connected called line is established. A single pole manually-controlled switch is common to the cord circuits for changing the circuit connections whereby the automatic intermittent control is removed and an application of ringing current to a connected called line is positively effected by each operation of a key.



No. 1,195,163.

1,194,851. August 15, 1916. AUTOMATIC TELEPHONE SYSTEM; A. E. Lundell, New York; assigned to Western Electric Co. In this automatic system a conductor extends to an electrically-operated switch which has multiple-connected guarding contacts, one of the contacts being in the conductor. There is a stepping magnet for the switch and provision is made for joining the magnet to the conductor. An impulse relay joins battery to the conductor. A second battery of different poten-

tial than the first battery is placed in series with the stepping magnet so that battery potential is continuously applied to the guarding contacts.

1,194,959. August 15, 1916. TELEPHONE INSTRUMENT; A. L. Cotton, Brunswick, and J. S. Wicking, Australia; assigned one-third to G. G. Turri, Melbourne, Australia. The receiver and transmitter of this instrument are in circuit with lead-in and lead-out line conductors. The windings of an electromagnetic device are never directly or indirectly in circuit with the speaking lines of the instrument, but its armature functions as a circuit controller normally maintaining the transmitter circuit open. This controller is actuated by the first ringing impulse current which traverses the winding of the electromagnetic device and closes the transmitter circuit. The controller may be positively held closed independent of the electromagnetic device to set the instrument for instant conversation. Provision is made for releasing the controller, permitting it to return to its normal open position, as desired.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

New Companies and Incorporations.

LENOX, KY.—H. McClain, W. T. Caskey and Ellis Caskey have incorporated the Lenox Telephone Co., with capital stock of $870.

CARLYLE, MONT.—The Beaver Valley Telephone Co. has been incorporated with a capital stock of $10,000. T. A. Morris, F. M. Hopper and L. Preiner are the incorporators.

MCKENZIE, N. D.—Organization of the West Sibley Telephone Co. was perfected at a meeting of farmers held recently. The company will cover a district of about 40 miles around McKenzie, 41 subscribers already being signed up. A. Madland, S. R. Day, C. W. Malmquist, E. Bloomquist and P. P. Bliss were elected directors of the new company and from these directors the following officers were named: President, A. Madland; vice-president, S. R. Day; secretary, C. W. Malmquist; treasurer, Elmer Bloomquist.

MILLERSBURG, OHIO.—The Millersburg, Wooster & Orrville Telephone Co. has incorporated with $500,000 capital stock. C. M. Lovett is one of the incorporators.

SNYDER, OKLA.—The Vickers Rural Telephone Co. has been incorporated. The incorporators are A. O. Grissom, R. G. Hardin, and J. O. Nailon, all of Snyder.

Construction.

LANESBORO, IOWA.—The Lanesboro Mutual Telephone Co. is making arrangements for the erection of a new exchange building on a lot adjoining the Lanesboro Savings Bank.

HENDERSON, KY.—The Cumberland Telephone & Telegraph Co. will make improvements here at an estimated cost of $8,000. The open wire system will be changed to cable, it is stated.

SPRINGFIELD, MO.—The Missouri & Kansas Telephone Co. is extending and improving the long distance and local lines in and around this city.

BUTLER, PA.—The Peoples Telephone Co. is adding another story to its exchange building, and is planning to remodel the other two.

NASHVILLE, TENN.—The Cumberland Telephone & Telegraph Co. has awarded the contract for a four-story exchange and office building, which will cost approximately $300,000.

BURKETOWN, VA.—The Burketown Telephone & Telegraph Co. will construct a 50-mile telephone line.

Underground.

ELYRIA, OHIO.—The Elyria Telephone Co., after several unsuccessful attempts, has obtained permission to put its cables underground through a portion of the business section of the city and under the New York Central tracks.

Elections.

KENSINGTON, KANS.—At the annual meeting of the Farmers' Co-Operative Telephone Co. the following board of directors was elected: A. H. Day, A. D. Chance, Ray Schoeni, M. Trump and Leroy Kennedy. The total receipts for the year, from July 30, 1915, to July 27, 1916, were $5,319.09, while the total expenditures were $4,884.90.

AVIS, PA.—The stockholders of the Clinton Telephone Co. met recently and elected the following directors: M. B. Rich, Dr. J. M. Corson, E. C. Tobias, W. M. McKinney and G. Thompson.

HOOVERSVILLE, PA.—The Central Telephone Co. reorganized recently and the following directors were elected: Edwin D. Schade, general manager of the Johnstown Telephone Co., W. H. Sunshine and Howard C. Cook. J. F. Nisley was made president: John H. Reitz, founder of the Central Telephone Co., vice-president; J. W. Wagner, treasurer, and L. F. Wagner, secretary.

RALSTON, PA.—At the annual meeting of the stockholders of the Ralston Telephone Co. held recently, the following officers were elected: President, Dr. Howell, of Cogan Station; vice-president and treasurer, E. M. McCracken, of Ralston, and treasurer, Dr. J. F. Fleming, of Trout Run. Besides these officers, the following were elected directors: L. C. Warren, of Williamsport; G. Kiess, of Ralston; Amos Smith and Frank Livermore, of Lycoming township; H. R. Fleming and William Fry, of Williamsport; I. J. Truman, of Trout Run; J. J. Noon, of Bodines; John Bidlespacher, of Rose Valley, and E. J. Dexter, of Ralston. The auditors elected were E. J. Dexter, Harry Jones and L. C. Warren.

Financial.

INDIANAPOLIS, IND.—The common and preferred stock of the Indianapolis Telephone Co. have been listed on the Cincinnati Stock Exchange.

RALSTON, PA.—At a meeting of the directors of the Ralston Telephone Co., held recently, it was decided to declare a dividend of 6 per cent. Last year the dividend was 5 per cent.

HAVANA, CUBA.—The board of directors of the Cuban Telephone Co. has declared a dividend of 12 per cent. on the preferred stock, payable September 15 to holders of record September 1. It was also decided to consider a dividend on the common stock in September.

Miscellaneous.

NAPA, CAL.—The Pacific Telephone & Telegraph Co. will expend $4,280 in the next 150 days making improvements on its lines between Napa and Calistoga.

LINCOLN, KAN.—F. W. Herman sold the Lincoln telephone exchange to the United Telephone Co., and the new owners have taken possession.

HAVEN, KAN.—The Haven Telephone Co. has been sold by W. T. Wisecup to the Tonn Brothers, who will take possession September 15.

HODGENVILLE, KY.—Larry Burch, formerly of Cecilian, Ky., has purchased the Hodgenville Telephone Co. from A. M. Lee. The consideration is said to have been about $8,500.

CLEAR WATER, MINN.—The Deer Park Telephone Co. and the Clear Water Telephone Co. are planning to consolidate.

NEVIS, MINN.—E. L. Harmer of Park Rapids has purchased an interest in the Nevis Telephone Co.

GLASGOW, MONT.—The Four Valleys Telephone Co. has taken over the business of the Moore Telephone & Telegraph Co. The following are the newly elected officers of the company: R. J. Moore, president, and George E. Alsop, secretary and treasurer.

DAVIDSON, OKLA.—J. M. Dixon has sold his half interest in the Davidson Telephone Co. to J. A. Dickerson.

MIDDLETOWN, PA.—Directors of the Middletown Telephone Co. met recently and approved an order for the sale of the company's stock to the Cumberland Valley Telephone Co.

BRYAN, TEX.—The city council has granted the Bryan Telephone Co. a franchise to operate a telephone exchange in that city for a period of 20 years. The company agreed to furnish the city ten telephones free of charge for the first ten years and fifteen telephones free of charge for the next ten years.

STEPHENVILLE, TEXAS.—The Stephenville Telephone Exchange, formerly owned by W. H. Crouse, has been sold to T. M. Toombs, of Eastland, Texas.

HASTINGS, ONT., CANADA.—The Ontario Railway and Municipal Board has granted the Bradden Telephone Co. permission to increase its rates from $10 to $12.